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GEOGRAPHY.

THE HOWGATE EXPEDITION.

The following extracts from the private journal kept by Dr. Rohé, surgeon of the Howgate Expedition, furnish a brief record of the voyage of the Gulnare from Washington to St. John's, N. F.:

Weighed anchor at 9:20 p. m., on June 21st, and reached Hampton Roads June 22d at 11:00 p. m. Steamed out of the Roads in the afternoon of the 24th and passed through the capes about 5:00 p. m. On the 25th there was considerable swell but the weather was pleasant. On the 26th hourly meteorological observations were begun by Mr. Sherman, Mr. Jewell and myself assisting, each taking a watch of eight hours.

June 27th was cool and pleasant. The ship behaves very well, both under steam and sail. About 9:00 p. m. it became very foggy, and at 11:00 p. m. the fog was so dense that objects could not be distinguished at a very short distance.

June 28th. A rather monotonous day. About half-past eight at night, however, the engineer startled the whole party by the announcement that two of the fire-boxes had collapsed, rendering the engine unserviceable. He made no explanation of the cause of the trouble. The accident is a great disappointment to all of us.

June 29th. The breeze was fresh and the weather cool, damp and foggy.

June 30th. The weather was pleasant. We are north of the latitude of Halifax, as the coast of Nova Scotia is in sight. Capt. Palmer thought it im-

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prudent to make for Halifax harbor during the fog yesterday, and has determined to proceed directly to St. Johns.

July 1st. The weather was cool and foggy, and the wind fresh during the day.

July 2d. Nearly calm throughout the day.

July 3d. Brisk head wind and considerable swell.

July 4th. At 7:00 a. m. the temperature was 51°. The wind and sea-swell of yesterday continued during the day, at night it was very rough and stormy. Foggy at intervals yesterday and to-day.

July 5th. Heavy swell still continues. The vessel is making fair progress under sail, although the cargo is not properly trimmed, there being a decided list to port.

July 6th. Almost calm to-day. Sighted a number of small icebergs yesterday and to-day.

July 7th. At daylight Cape Spear, just south of the entrance to the harbor of St. Johns, N. F., was seen about five miles off, and soon after we signaled to a tug to take us into the harbor. At 9:00 a. m. dropped anchor opposite the Queen's wharf.

On the eighth day of July Mr. Sherman, Mr. Jewell and I began a series of observations on shore, with the magnetometer, dip-circle and pendulum.

During our three weeks stay in St. Johns the observations were continued every day except Sunday, and a good series of results obtained. Hon. John Delany, Postmaster General of the province of New Foundland, placed his well-appointed private observations entirely at the disposal of Mr. Sherman and rendered all the aid possible in order to make our work pleasant and satisfactory. For many personal favors, I am under obligations to him.

As soon as the vessel arrived, a board of survey inspected the damaged boiler, and steps were taken to have the damage repaired. I do not know what the official report of the board is, but I gathered from conversations with members of the board and other engineers, that the accident could only have resulted through the carelessness or incompetence of the engineers in charge of the vessel. The same impression is, I believe, current among the gentlemen composing the scientific party and the officers of the ship.

The engineers left the vessel at St. Johns and returned to the United States on the St. Alhambra of the Cromwell Line.

Of the present engineers, nothing but the best reports can be heard in St. Johns, where they are both well known. Mr. Stein, the chief, is a German and has a certificate of competence from the German government. He is also a practical machinist, and the business-like manner in which he attends to his work inspires every one with confidence in his ability and prudence. The assistant, Mr. McRobbie, appears to be equally proficient in the practical work of his department. Both of these gentlemen have been in charge of the engines of steamers plying along the northern coast either in the seal fishery or in the La-

brador coast trade. They are, therefore, thoroughly familiar with the management of a steam engine in the midst of the ice. They may, I think, both be relied on to do their duty as well as it can be done.

So far as I am able to judge, Capt. Palmer and his first officer, Mr. Bailey, are thorough seamen, whose prudence will take the ship wherever it can be done with safety.

In conclusion, permit me to state that my confidence in the sea-going qualities and entire safety of the "Gulnare" is not in the slightest degree impaired by the accident which has, it appears, caused no little uneasiness among the friends of those on board.

ACCIDENT TO THE GULNARE.

The following report of the Board of Survey upon the Gulnare on her arrival at St. Johns, gives officially the nature and cause of the accident to her boilers referred to by Dr. Rohé.

REPORT OF THE BOARD OF SURVEY.

We, George A. Pitts, mechanical engineer, associate of Kings College London, and member of the Institute of Mechanical Engineers of Great Britain; Robert Stein and Alexander Murray, sea-going Engineers-in-Chief, having been called upon by T. N. Malloy Esq., American consul in this port, and Captain Palmer, master of the S. S. Gulnare, to survey the boiler of said steamer, do declare that we have made a careful examination of the said boiler, and found the crowns of the three furnaces collapsed, and we consider the accident was due to carelessness. We base our opinion on the fact that during our examination we found deposits of salt on the crown of the furnaces to a thickness of about 5/8 inch. Further, the crown of the combustion chamber is in a good condition. We also certify that the damage done to said boiler can be repaired in St. Johns, and the boiler placed in good and efficient condition to enable the steamer to prosecute her present or any voyage. We also suggest that a stop-valve be placed on the boiler to supplement the ordinary butter-fly valve at present in use on the engine.

St. Johns, Newfoundland,	(Signed)	George A. Pitts.
July 7th, 1880.	(Signed)	R. Stein.
	(Signed)	A. Murray.

THE GULNARE AGAIN AT SEA.

The Gulnare left St. Johns July 30th, for Lady Franklin Bay, which locality it was proposed to attempt reaching without stopping at Disco, as originally contemplated.

THE CRUISE OF THE CORWIN.

The official report of Captain Hooper, commanding the revenue steamer Corwin, now in the Arctic in search of the missing whale vessels and under orders to communicate with the Jeannette, was received at the treasury department August 6th. The report is dated Norton Sound, June 19th. Captain Hooper says:—

We left Ounalaska on the 8th inst. and visited St. George and St. Paul's on the 9th inst. After communicating with the special agents on these islands and taking on board a quantity of pup seal skins for Arctic clothing for the officers and crew and putting the ice breaker in place we proceeded north the same evening.

On the 11th we encountered ice a few miles north of Nounivak Island, in latitude 60 deg. 45 min. north, longitude 167 deg. 50 min. west. A fresh southwest gale was blowing at the time, so we did not enter the ice until it moderated on the 13th inst., after which we worked our way along to the northward, taking advantage of every opening or lead which showed itself. We worked along in this way, sometimes making a few miles a day and at others drifting helplessly in the pack until the 17th inst., when a sharp northeast gale broke up and opened the ice and started it off shore, allowing us to proceed on our way the following day. We arrived here this afternoon and found the sound filled with ice. We are now at anchor sixteen miles from St. Michael's. We shall endeavor to get a boat ashore to reach there overland to-morrow and deliver the mail which we have on board for that place, and continue northward as fast as the ice will permit.

All hands are in good health and everything satisfactory. The Corwin has proved herself a very able vessel. Although forced through heavy ice for nearly a week, and at times lifted bodily up by the pack she seems none the worse for it. I hope to be in Kotzebue Sound ahead of the whisky traders and break up their illicit trade for the summer. I shall endeavor to get some tidings from the missing whalers from the natives in Kotzebue Sound, and also from those on the Asiatic side, either in Plover Bay or in the vicinity of East Cape, whichever the ice will permit us to visit first.

While in the ice, off Romanzoff, some natives visited the vessel and reported the past winter as the most severe ever known, and some sealers from Norton Sound, who have just come on board, confirm the report. They say the ice in the sound only broke up yesterday.

A day later than the report Captain Hooper wrote to Major Clarke, chief of the Revenue Marine service, giving an account of the hardships already experienced on the voyage northward. In this letter he says:—

This will be the last chance to report, I suppose, until we return to San Francisco. We had a hard passage through the ice. We entered it on the 13th, after trying in vain to get around it, and were six days getting here. The first

day we only made about forty miles, and the second day about twenty. The third and fourth days we did not make any distance at all and had as much as we could do to save the vessel. The ice set us in off the lower mouth of the Youkon in five fathoms of water. At this depth about half the ice was aground and the floating ice was carried by it by the current at least three knots an hour. The crashing and warring of the ice on all sides as the drift ice struck that aground was demoralizing to weak nerves. Of course we were carried along with it and several times were caught in the "nip"

Our engines had no more effect on the vessel than a toy engine would have had. We came near losing our rudder, and at times our boats were in danger, the ice was so high. The screw steering gear was carried away and the wheel chains parted. After realizing the effect of a "nip" I saw the necessity of having the rudder so it could be unshipped at short notice. So I went to work, fitted a piece of oak plank over the rudder head so that it could not unship itself, but can be removed readily if necessary, cut a piece out of the apron the size of the rudder casing and cleared the rudder head of the patent steering gear and everything that would not go down through the cashing, made a band and put in to keep it from cracking, rigged a pair of shears over the stern and made a purchase, then put all hands at work and carried coal in sacks forward until her stern was raised out of water sufficiently to get at the woodlock and split it out. We can now unship the rudder and land it on deck in three minutes, and after a little practice can do it in two. I think I have no fears of losing it now.

This is tough business on revenue cutters, I can assure you. If we had not forced her through the ice we would not have been able to get far along for three weeks yet. I thought it was all up with her on the morning of the 18th. We had been at anchor close in under the Cape Romanzoff during a northeast gale and snow storm nearly all day of the 17th, and on the 18th it backed to northwest right on shore and blew harder yet. The ice had been broken and started off shore by the northwest wind, and, of course, as soon as the wind changed it came back. We got under way and tried to work out into the pack to keep from going ashore, but for a while it showed such a solid front that we could not penetrate it The ice kept driving us in shore until we had only two and three-quarter fathoms of water, when an opening showed itself and we shot into it and succeeded in getting fast to a piece that was aground in five and a half fathoms and rode comfortably until the gale broke and the ice started off shore again. The piece we made fast to probably covered a surface of four acres, drew thirty-three feet of water and was about twenty-five feet high above the water, so you can form an idea of what the Behring Sea ice is like. Our pilot says he never saw anything like it outside of the Arctic.

A native has just arrived from the shore with a note from the Alaska Commercial Company, who reports the winter as having been terrible—very cold, with an unusual amount of snow and heavy storms. None of the traders have arrived from up the river yet. The wild geese, which usually have their young

hatched out by this time, have just commenced to arrive and lay their eggs. We will start north to-morrow, or perhaps this evening if the ice shows a break. I don't expect to get further than Kotzebue Sound for a month. We won't spare her, but will push on as fast as possible. I have no fears but we can go as far as any one. The Corwin has good power and is very strong.

IS THERE AN OPEN POLAR SEA?

CONCLUSIONS AGAINST THE POPULAR THEORY DRAWN FROM THE RESULTS OF MANY BOLD AND ENERGETIC EXPLORATIONS.

Dr. I. I. Hayes, the Arctic Explorer, in a recent letter to the New York *Herald*, expressed his well known views in reference to the existence of an open polar sea; to which a Springfield, Mass., correspondent takes exception as follows:—

In Dr. Hayes' letter on the prospects of the Jeannette there is one paragraph which is of so much importance in view of the history of opinion in regard to the open polar sea, that I wish to advance some considerations weighing against the opinion there expressed, in the hope that Dr. Hayes may see fit to publish his views more at length in the *Herald*.

In speaking of the intention of Captain DeLong he says:—"Of course no one imagines that there can be any such thing as a sea about the Pole wholly free from ice, but it is equally inconceivable that so large a body of water, embracing an area of more than three millions of square miles, could be at any time firmly and completely frozen over." And he infers that should captain DeLong reach the northern termination of Wrangell Land he would encounter large areas of open navigable water. The opinion here expressed by Dr. Hayes that there is in the extreme north a virtually open sea, is the same as he advances at the close of his account of his attempt to reach the open polar sea in 1860—61; and the argument is also the same—viz: that within the encircling shores of the northern continents, that is, roughly, within the parallel of eighty degrees north latitude, there is a vast expanse of sea where the ice cannot fasten itself to the land and will therefore of necessity be broken to pieces by wave action. Now, if it were an ascertained fact that there is this vast polar water, this conclusion might seem to be necessary; but what support is there to the opinion that we have this great unbroken expanse of water at all?

The progress of northern exploration, great as it has been, has never yet advanced beyond the boundaries of land. Parry, to be sure, in his remarkable attempt to reach the Pole from Spitzbergen, penetrated to 82° 45′ without finding land, but his journey proves nothing as to its existence or absence within a comparatively small distance of his furthest point, for traveling on the ice, he could not possibly have distinguished a low Arctic coast at a few miles distance. The memorable experience of the Austrian expedition of 1872 is well known. After

drifting north of Nova Zembla for months, fast in the ice, over an unknown sea, they came at last (about latitude 79°) on a new land, which was traced by Payer above 82°, and the extreme vision of the Austrians was bounded on the north not by water, but by land, whose nothern limit and dimensions no one knows. Again, it is well known that Arctic explorers of experience find in the reports of the English expedition of 1875—76 reason for belief in the existence of land beyond the eighty-fourth parallel. The tremendous character of ice of the so-called palæocrystic sea, and the great hummocks which baffled Markham's sledge party, together with shallowness of the sea at the extreme point reached by Markham, are regarded as very strong proofs of the existence of land very much further north than any yet known. It is to this land to which Howgate's colony scheme looks in large measure for success, since it may offer a coast line trending north and reaching to or near the Pole. No one also yet knows the extreme northerly extent of Greenland and adjacent lands. The extreme vision of the English saw only the west Greenland coast losing itself in the mystery of the Arctic snows and ice north of 83°. And finally DeLong's expedition itself is proof of land in the extreme north in yet another quarter than those named. That Wrangell Land exists north of Siberia is known. How great it may be and how far north, no one knows. Dr. Hayes himself admits it may reach to the Pole.

It then remains true that whithersoever men have gone in the far north they have found not sea only, but land also. It seems a fair deduction from the past history of exploration that wherever they may hereafter go, there they will still find land. If, now, this is so, until we know accurately the amount and disposition of these Arctic lands all conjectures based on their presence or absence must be idle. Suppose these lands to be grouped anywhere about the course of the Jeannette, will we not have then just the conditions of coasts approaching one another sufficiently near to allow the ice to form and accumulate and pile itself up in the enormous masses of Nares' palæocrystic sea or of those whose tumult seemed pandemonium let loose around the Tegethoff, while her navigators were yet, as they supposed, in the midst of a boundless sea?

In the introductory chapters of his book, Payer, reviewing the history of Arctic explorations through three centuries, remarks on the doctrine of the open polar sea and demonstrates, it seems to me, the groundlessness of that opinion by showing how, as men have approached, as they supposed, the northern boundary of that ice belt which they believed to girdle the open sea, that boundary has ever receded and the ice has ever grown heavier, the climate more severe, the nearer they have drawn to the Pole. If, then, there is virtue in the consistency of reasoning we must assume that beyond where man has reached, the same law holds true—that the further north we go, the thicker the ice becomes and the severer the climate. Any other conclusion is contrary to the known facts, and the belief in the open polar sea would seem to be born solely of splendid enthusiasms, high courage and desire to pierce the fascinating mystery of the far north.

D. W. B.

GEOGRAPHICAL SOCIETY OF FRANCE.

(FROM "L'EXPLORATION.")

Sitting of July 18th.—M. A. Grandidier in the chair. Meeting opened at eight o'clock. After reading of the official minutes, the president signaled the attendance of M. Pinard, the young explorer from Arizona, who will return to his explorations as soon as the state of his vision, considerably weakened, will permit—also the presence of Dr. F. M. Moreno, director of the Anthropological and Archæological Museum, at Buenos Ayres. This learned South American, continued the *resume* of his explorations, in the as yet scarcely known country of Patagonia, as follows: In 1873 I made my first voyage to Patagonia, in order to dig into the Indian burying grounds along the Rio Negro. After two months of excursions, I returned with forty-two skulls and some hundreds of stone implements. In 1874, I returned to the Rio Negro. My excavations gave me eighty crania, some incomplete skeletons and three hundred stone objects. From the Rio Negro, I passed to the Rio Santa Cruz; in order to ascend it, but some obstacles preventing me, I was only able to make some ethnological collections, in the environs of the sea.—In 1875, I left overland, from Buenos Ayres, for the purpose of passing over Patagonia until I reached Chili.—Arriving at the Rio Colorado, I continued my anthropological researches, and at the Rio Negro, for the third time, I was able to augment my collection of skulls. Leaving this place, with a domestic and five Indians, I followed the banks of the river and arrived on the slope of the Andes. There the Araucaniens or *Manpuches* impeded the continuance of my voyage. Condemned by a council of war, I obtained permission to visit lake *Nahuel-Napi.* After some weeks of hunting, of religious feasts and orgies, I was given leave to return to Buenos Ayres, where I arrived after having had a battle with some Indian cattle thieves. I left immediately for the northern part of the Argentine Republic, with the object of excavating the ancient forts and cities of the *Colchuguis.* In October, I left for the fourth time, for the purpose of traversing Patagonia. After making some collections at Chuburt and Port-Dèsirē, I commenced the exploration of the Rio Santa Cruz. There, with my canoe, I penetrated as far as the lake from which it takes its origin. I could see two other lakes to the north, alive with Indians, also a volcano in activity, which I baptized with the name of Fitz-Roy. I reached afterward, by land, the strait of Magellan and returned to Buenos Ayres. On my return, I donated all my collections, anthropological, zoölogical and palæontological, to the government which has established the museum of which I am the conservator. To augment this collection, I left in October, 1879, for a voyage of two years in Patagonia. After ascending the Rio Negro, in my little steamer, 400 kilometers, I directed myself to the South, on horse-back, to the distance of 100 kilometers, thence to the west-south west, traversing a region as yet unexplored. In the place of plains and table-lands, I saw mountains from 1000 to 2000 meters in height. Here I discovered some ancient volcanoes, and some basaltic grottoes, which had served

as human habitations; also some human skulls. Arriving at 43° 30′ south, at the foot of the Andes, I found some Indians, and some days afterward, I continued my course to the North. I explored the banks of the lake *Nahuel-Napi*, where I found some grottoes containing bones. Here, at the western part of the lake, some Araucanien Indians took me prisoner—brought into the presence of the principal chief, whom I had known in my voyage of 1875, I was passed to a council of war, and after three days of feasting, I was condemned to death.—"God was angry, and the heart of a Christian must be sacrificed to Him." Two days afterward, I escaped in the night, with my domestic and interpreter. We constructed a raft, and after two nights and seven days of travel, through the rapids, we reached the Argentine encampment. My companions, whom I had left in a hospitable Patagonian village, informed by a friendly Indian, had saved my anthropologieal collection and my botanical gatherings—I was able to save on my person a part of my journal and some astronomical observations made at twelve different places. Arrived at Buenos Ayres, I was sent, on recommendation of physicians, to Europe. * * * * Session closed at 10.30.

J. F.

THE KHEDIVE'S GEOGRAPHICAL SOCIETY.

(FROM L'EXPLORATION.)

The session of June 11th was well attended, considering the terribly hot weather. It was devoted, as announced by the order of the day, to a conference with Dr. Zucchinetti, who left Cairo in the month of January, to make an excursion to the provinces of Bahar-el-Gazar and Bahar-el-Arab, thence to a part of Darfur, and of Kordofan, and also to that region of Nubia situated to the south of Obeida, a country as yet scarcely known.

He commenced his discourse by exposing the vast project he had conceived of traversing Africa as far as its southern extremity, for the purpose of studying it from a statistical and scientific standpoint, and for placing it in condition to contribute to that grand activity, in which intelligent Europe desires to place this part of the globe, heretofore so much neglected.

He then traced briefly, the line followed from Cairo to Khartoom, skirting the Nile, from Khartoom to Chiri along the White Nile as far as the third degree of latitude, where he was stopped by unexpected difficulties; also sketched the route of his return from Chiri to Gaba-Sciambia, thence to the West, to the Macracas, the Niam Niams, the Gouro-Gouras on the Bahar-el-Arab, to Sciacca, to Fasher, to Obeida in Nubia, to Khartoom, to Djeddah and to Suez.

He interrupted the recital by quoting some notes, made in the course of his voyage, which excited the most lively interest. The Doctor spoke lengthily of Khartoom, Lake Noo and of the Leds (falls) which arrest the navigation of the river, and of the way to avoid them. He then gave a description of the Egyp-

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tian military posts and their organization. Gen. Stone, who was occupying the presidents' chair with Mr. Bonola, then took the floor to announce that among the new members of the Society were counted the engineers Lafitte and Bangabe. He also stated that the Society had recently established relations and exchanges with the Geographical Society of New York, with the Typographic Society of Geneva, and with the journal *L'Exploration* at Paris. He pointed out the favor with which the publications of the Society had been received abroad, and cited as an example the Bulletin of the London Geographical Society, which had reproduced with praise, some articles from the Bulletin of the Khedival Society. He proposed the name of Rev. Mr. Wilson, for honorary membership, who had but a short time before returned from the land of King M'tesa.

Doctor Zucchinetti then resumed his narrative. He expatiated on the customs of the savage tribes, on the *fauna* and *flora* of the countries he had explored, and on the resources which this country could offer to European activity. He continued with the details of his voyage to Darfur, Kordofan, and to Nubia. This last country is rich in gold; and he indicated the manner in which the natives gather the precious metal. Finally, he exposed his views on the measures he judged most opportune for ameliorating these countries, both morally and materially; and after having defined the character of the negroes, he closed with the opinion, that penetrating the country with roads and colonies would be the most powerful means of initiating civilization. The ideas of the speaker gave place to interesting discussions, and were judged, on the declaration of competent men, like Gen. Stone, Purdi Pacha, Col. Saddek Bey, and Dr. Rossi Bey, to be worthy of a profound examination. J. F.

THE POSITION OF THE CROZET ISLANDS.

The admiralty have received from Captain J. N. East, R. N., of H. M. S. Comus, a report of his visit to the Crozet Islands, early in March, in order to ascertain if any shipwrecked people were there, and to endeavor to establish a depot of provisions. No trace of any shipwrecked crew was discovered, but the stores of provisions and shelter-huts were successfully landed. The most important information which Captain East communicates with regard to this group is, that Hog Island should be placed thirteen miles north and west of its present position on the admiralty chart. The position of the other islands with regard to it appears to be laid down with tolerable accuracy, excepting that East Island is not more than seven miles distant from the southeast point of Possession Island. The Heroine breakers are reported to consist of one breaker very similar to the Bellows off the cape, and to be only one and a half miles to the eastward of a straight line drawn from the south end of Hog Island to Penguin Island, and nearer the former island.

MURDERED EXPLORERS.

A telegram from Zanzibar states that Mr. F. Falkner Carter and Mr. Cadenhead, of the Royal Belgian Exploring Expidition, have been murdered by Chief Urambo in Central Africa. Chief Urambo is believed to be the celebrated robber chief, Mercambo.

EXPLORATION OF PATAGONIA.

Don Ramon Lista has lately returned to Buenos Ayres after a further journey in Patagonia, in the course of which he has examined in detail the whole of the coast region between Bahia Rosas and Punta Villarino. From the outset he was unable to find any water, notwithstanding that careful search was made in all directions, and the expedition would have been compelled to retrace its steps had it not been for the opportune arrival off the coast of a small vessel with supplies. The region explored is reported to be extremely sterile; and the soil, which is burned up by a tropical sun, is mostly covered with prickly and stunted plants.

Carl Petersen, the warm-hearted and faithful assistant to so many Arctic expeditions, in which he served chiefly as interpreter, died at Copenhagen, on the 24th of June, at the age of sixty-seven years. He was with Penny, driving his dog-sledge, in 1850–'51, when Penny wintered in Assistance Bay with the two brigs (Lady Franklin and Sophia) and explored part of Wellington Channel. Next he was with Kane in Smith Sound, then with McClintock in the Fox, and lastly on a voyage with Torell and Nordenskiöld, to Spitzbergen, in 1861. He was a fine old fellow, resolute and warm-hearted. Sir Allen Young introduced him to the Prince of Wales the last time he was at Copenhagen. Petersen had charge of a lighthouse until 1875, when he retired, owing to failing sight, on a pension of 600 kronen. The English government had recently granted him a pension of £12 a year, and last year a number of Arctic friends in this country subscribed together and presented him with a small sum. These acts of kindness were deeply felt by the grateful old man, but he lived only a short time to enjoy the increased comfort they afforded him. He lived with his sister, whose husband kept a restaurant at Copenhagen. In early life he was long stationed at Upernavik, and married there. He leaves a son, who is a surveyor, and a daughter who married well.

METEOROLOGY.

PROPHECY OF THE WEATHER.

BY ISAAC P. NOYES, WASHINGTON, D. C.

The weather has ever been a favorite theme for the prophets, and most miserably have they failed. All are familiar with the prophecies or statements of our almanac makers. For years they have pretended to foretell the weather for months in advance.

The statements of the old almanac makers though "gospel truth" to the many, were not regarded as wisdom by the few who were more advanced in intellectual culture, yet even those of the highest culture could simply say "they did not believe;" no positive evidence had yet developed by which they could successfully controvert what their intellects could not accept. They must await future developments and see what they would bring forth.

In 1870 they brought forth the United States Signal service, whereby we were no longer confined to the accumulation of a few isolated facts gathered by men having no facilities for immediate communication with each other, or any means of conveying intelligence to one central head where it could be digested and made to serve the world as kindred facts in other departments have done.

It was not even possible for the Signal service to grasp the full idea at once; time was needed to advance the practical work necessary for so great an undertaking, and as facts were accumulated, they suggested new fields for the intellect to revel in, until now we have a very complete system, though not perfect as yet, for time is still necessary to complete and to suggest other steps in the line of this advancing science.

The weather map has proved beyond controversy that the area of low barometer is the center and motive power of the storm, and that this area of low barometer travels, as heretofore stated, in an easterly direction, and that back of this power of low barometer, lies the generating heat force of the sun, the creator of this power. The sun is our great physical first cause in this as in other things connected with and essential to our well-being on this earth.

The negative part of the weather system is the area of high barometer, which plays quite as important a part in the weather of our globe as the area of low barometer itself. The details and influence of high barometer will be deferred for some future paper, simply remarking here that it is an important power and is ever on the move and in the same general direction as the area of low barometer, and that we can not have the one without the other—that the area of high barometer is as essential and natural in the lighter body air as the hill or mountain in the physical contour of our earth.

It is not pleasant to controvert such a venerable notion as that the moon affects the weather and that by studying its various "quarters" and conditions, we may be able to prophesy the weather months in advance. The moon, it must be remembered, is continually on the move and ever progressing with the earth and the while moving around it. It therefore must necessarily, and does in turn, shine on all parts of the earth. Wherever the sun shines the moon shines also. The sun being a powerful heating body, generates the conditions we term low barometer. The moon, being a mere reflector of light, has no such power —at least its heat power is infinitesimal, and therefore has no power to produce or affect the area of low barometer. But it is often claimed that it has power over the clouds to collect or disperse them, as the case may be. On the same night with the same moon, new, first quarter, half, full, last quarter or old, the same moon is shining over territories where there is all sorts of weather from hot to cold, and from clear, cloudless skies to extents of territory covered with the most dense snow or rain-producing clouds. In one place it may be clear, bright moonlight, in another not a ray of light to be seen even with a full moon. Then these places may be and are distributed over the earth at intervals of from 500 to 1,000 miles, and sometimes more. This being the actual condition of things, it seems most absurd to claim or believe at this day that the moon at all affects our weather, or that it may be relied upon as a basis on which to found prophecies of the weather. When the new moon is upright so that its two ends or horns are level with each other, it is claimed that throughout this moon, we will have little or no rain, because the moon holds its water. Then when the crescent tips a little, one side being higher than the other, according to the universal idea, we will have plenty of rain during that moon. As though the rain which waters our earth, must be held in this little basin up in the sky. It must be remembered that the moon is 240,000 miles away from our earth, and at the best calculation our atmosphere is not more than forty-five miles high, and more than this that the clouds from whence comes our rain, are not over two or three miles high, and often much less, probably less even than a mile high. Our rain comes from the clouds that are temporarily suspended in the air generated through the heat force of the sun from the waters of the earth.

The sun is ever forming these clouds. The power of the moon in this particular is not worth considering even for a moment—might as well claim that the moon causes plants to grow, and is an agent for the generation and maintenance of life on this globe. As it rotates about the earth it happens that it goes through certain phases which western new moon, quarter, full, etc., and that at times the horns of the new moon will be level with each other and at other times not—all depending, as any one familiar with astronomy will know, on the relative positions of the sun, earth and moon. The sun will always shine on that side of the moon that faces the sun. This is a most natural effect and needs no proof. Relatively to the earth the moon must change, for the simple reason that these three bodies are ever changing their relation to each other, and this readily

accounts for the different appearances of what we call the "new moon." The light of the sun shining on it, relatively to us, underneath, at other times a little to one side. That these merely accidental changes of the moon that have no significance as a motive power, positive or negative, that they should be a power to affect the conditions that produce or prevent rain that comes, and can only come by the generating force or heat of the sun, is most absurd, or that it should have any power over the motion of the clouds which are concentrated or dispersed only by that power generated by the sun which we term "low barometer." The prophecy of the weather based upon any such ideas as that the moon has any influence in producing such results, is most absurd and can not be maintained by facts or the least show of reason. We may have evenings where the sky over our particular locality becomes clouded when the moon is visible, or it may be cloudy and after awhile the clouds pass away, but not through any agency of the moon. If the moon had any such power as this, it would produce the same results every time, but we see that it does not, but rather with all sorts of moons we have all sorts of weather and changes which may readily be traced to a far more reasonable cause—that of the relative conditions of low and high barometer as effected by the great source of heat and light—the sun.

Another source of prophecy of the weather, is something which belongs rather to a season than to any extended time of years—a sort of sub-prophecy depending upon a prophecy of cold winter and warm summer, especially at the poles, is that of cold in summer developed from melting icebergs as they float down from the Arctic seas. This summer of 1880 there are a remarkable number of these icebergs. So the iceberg prophets are prophesying cold weather, especially off the Atlantic coasts.

When it becomes better understood that the heat of certain localities depends upon the concentrated power of the sun, making what we term the area of low barometer, and that this concentration is ever on the move, sometimes on a lower line of latitude the whole year through—when this beautiful law of nature is understood, it will be seen that the melting or non-melting of icebergs out in the Atlantic ocean, will have little or no effect upon our temperature, not one-tenth part as much as the melting of the ice in our ice-carts as they pass along the streets, or the melting of the ice in the refrigerators and water coolers of our houses.

Although the sun shines more directly over the equator than over the poles, and it is therefore warmer at the equator than at the poles, still the heat of the sun is not wholly concentrated there, and it is oftentimes warmer in the temperate zones than in the tropics, as discussed in a former paper, "Evidence From the Weather Map of 1879."

The melting of icebergs cools the immediate surrounding water and atmosphere, but its influence, like the melting of the ice in our ice houses, ice carts, refrigerators, or water coolers, is purely local.

In this connection the idea suggests itself that we make a better study of

icebergs than we have heretofore done, and that one or more of our idle navy vessels be authorized to follow them, keeping as near them as safety will permit, and study them day by day and trace them up until the largest 'berg disappears under the heat of southern latitudes.

Then there is another, though fortunately a smaller class, who make some pretensions to scientific wisdom who have notions that the weather of our planet must be more or less affected by the relative position of our earth and her sister planets in the universe. For this year, these prophets have predicted all sorts of commotions in the elements because some four of the principal planets of our system come together nearer to the sun than for some eighteen hundred years or more. Indeed they are already out with their extravagant claims that (up to July) we have already had the fulfillment of the prophecy.

Now, the weather of this year has not been remarkable for its peculiarity thus far. We have had some severe storms, but what season do we not have them? They occur more or less frequently every year. This year, thus far, (July,) has not been greatly different from the average year. But when this class of prophets have prophesied, like Jonah, they want their prophecies fulfilled even though it bring great distress upon the nations. They do not like the mortification of being false prophets, or to see their scientific pretensions laughed at by the world.

Probably the most remarkable sensation as a weather prophet at present, is Mr. Henry G. Vennor, of Montreal. The name of this gentleman has been very conspicuous in the papers the past season as a weather prophet. Many people have faith in him and verily believe that he is reliable, and are willing to swear by him and contend that he predicted this and that storm, or spell of hot or cold weather.

When men claim to be prophets we want them to come out with plain and unequivocal statements. We want no "if" or "and," or general statements of uncertain sound, but the plain statement in black and white, just what will and will not occur.

According to the St. Louis *Republican*, in a letter dated Montreal, May 18, 1880, he says: "I believe that June will be an intensely hot month, and probably the first of June will be fall-like, with frost again. July will be a terrible month for storms, with terms of intense heat, but another fall-like relapse with frosts, will, in all likehood, occur a few days before the twentieth. I fear the storms of thunder and hail will be of unusual severity during July. I must claim the verification of my prediction relative to a cold wave, with frosts, over a large portion of the United States between the 10th and 15th of May. The relapse toward the close of the present month (May) will be more severe than that just past."

This is probably a fair sample of Mr. Vennor's predictions. We see that they are very general and non-committal as to exact dates and localities.

Mr. Vennor's first statement in this short article is that "June will be an intensely hot month" Where will it be hot—in Canada, or North or South of Ma-

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son and Dixon's line? It might be very hot in Pennsylvania or even in New York state, and yet very cold in Montreal. Over what territory must it be hot or cold to fulfill Mr. Vennor's predictions—in the Atlantic states, out West, or at the North or South? He claims the verification of predictions relative to a cold wave over the United States between the 10th and 15th of May.

As to the month of Juue, it was not unlike June weather in general, unless perhaps a little colder, as a whole. In the vicinity of Washington it was rather a cool month, though we had a few very hot days, still not as hot on a whole for the season as was the month of May. The greater part of May in this vicinity was very hot and oppressive, and that too for a very good reason—and it is never hot or cold relatively to the season, without this good reason.

May 10th and 11th it was very warm here. On the 11th, about 4.30 P. M. we (in Washington) had a summer shower with thunder and lightning, which lasted about an hour and then became cooler, as it generally does, though not always after such a storm. From the 12th to the 18th of May it was cool and pleasant, very seasonable weather for the time of the year. On the 14th of May it might have been intensely cold throughout the United States, East of the Mississippi but for a rather unusual relative location of the area of high barometer. On the 14th of May *Low* was on a line with the south-end of Florida, while *High* was to the north of Washington, thereby preventing Mr. Vennor's prediction falling true in force, or at least ameliorating it much. The latter part of May was extremely hot notwithstanding Mr. V's. prediction that we then would have a severe relapse.

July, Mr. Vennor says, will be intensely hot with terrible storms with another fall-like relapse. Now we all know that July is very apt to be hot and therefore to be accompanied with severe storms, and it is not an unusual occurrence to have a cold spell or two during the summer and that we are as liable to have it in July as in June or August.

In all these statements Mr. Vennor is no nearer, and gets as far from the mark as any other man who will study the Smithsonian or other reliable reports of the weather of the United States from year to year and venture a guess in accordance therewith. Fortunately for such prophets, the people, and even the people of high mental rank, are still quite ignorant of this weather question. It is a new subject. Many may disbelieve but at the same time they are unable to refute, so are very charitable to pretensions of this kind, coming from what they think or regard as commendable authority.

These changes of weather which Mr. Vennor speaks of never occur without a good and sufficient cause—a cause that may readily be understood by any intelligent person who will simply read the weather map—for it is there daily recorded in legible characters that never deceive. For example, it cannot possibly be hot in the nothern part of the United States or Canada, unless there is an area of low-barometer in that locality. It cannot be cold throughout the United States unless the area of low-barometer is on a low line of latitude. There is an end-

less variety of changes which the movements of low and high-barometer may make—more endless than the strains that could be played upon the "harp of a thousand strings." Sometimes by the peculiar location of the area of low barometer it may be warmer in the extreme north-eastern part of the United States, than in Virginia. For example, let the area of low-barometer be located off on the Atlantic Ocean and in the immediate vicinity of Calais, Me., as it was some two or three years ago this spring. Being on a high line of latitude, it caused the warm winds from the South to concentrate there, while it being so far to the East of Washington, and reaching down into the ocean, caused a severe West wind slightly to the North of West which made Washington one of, if not the coldest (recorded) place in the United States and much colder than Calais, Me., notwithstanding the fact of lower latitude.

Now when a cause is so well known, how much better would it be for these weather-prophets to say, that on such a date of such a month the area of low-barometer will be in such and such a locality—then those who know what ought to follow—what would be the result of such a location of *Low*, will know just what to expect. We will know whether it is to be cold or hot, in New England and the North-east generally or in Kansas and Missouri and the North-west. If these prophets will only tell us where *low* will be they will far surpass their present prophecies and the world, at least the intelligent world, will truly wonder at their knowledge of the works and ways of the great mysteries of nature. But until they can do this they had better not attempt any more of their present "prophecies," which are merely guesses which may be equaled by any number of persons who will study well the compiled weather reports of the past years and venture guesses in accordance therewith. Prophets should be men of superior and not inferior knowledge in the department in which they propose to prophesy. For such a course will only make them contemptible in the eyes of the world, when it comes to fully understand the cause that effects these matters.

In reading these comments on the prophecy of the weather, it may be asked if there is any method by which we may know or prophesy the weather for any great period in advance. For one I do not believe there is any such method, for the reason that these changes depend, as repeated over and over again in these papers, that all depends upon the location of low and high-barometer and that these relations are ever changing, and the changes seem to be an endless surprise that cannot, so far as we know at present, be determined upon, even from one change to another, much less of changes that may follow each other, weeks and months in advance. Though if any law in this movement of low and high barometer is ever discovered it will only be by the careful study of the weather as recorded on the weather map.

This may sometimes be the case, but the Signal office has advanced in its line of indications until they have made a record for a year of ninety-five per cent, in accuracy, and this must be acknowledged is not far from perfection. Why not have the indications right every time? Let one become familiar with this subject and he will readily see *why*.

There are many reasons why. There are many people of exacting nature in the world, who always want positive statements that such and such *will be* or *will not be* the case, and their natures cannot conceive any circumstances but what the human mind can control; and when "circumstances" is mentioned to them, they have no place for the word in their lexicons, and with Napoleon I. when in success, they exclaim, "I make circumstances;" by and by a Waterloo comes and they see perhaps when too late, that there are circumstances which even the strongest man cannot control. If in the affairs of men there are "circumstances" beyond the control of these strong men, much more are there circumstances in nature that man must abide by. Nature is endless in her varieties, and man is powerless to prevent or at all times even to foretell her exact course. Probably nothing better illustrates this than to pour some water down a slightly inclined plane and note its course. We know that water will run down hill, but it does not take what appears to be the most direct course. We know and can readily predict that it will take, if left to itself, a certain general course, but when the practical reality takes place, we not only discover that it takes a course of its own, but that it passes over certain lines and circumvents spots, even in so small a surface as a few yards in length, that it was and would be impossible for human knowledge to specify or indicate before-hand. This being the case in nature when confined to a few yards square, what must be the effect of an area of low-barometer passing over variable territory of more than a hundred miles square.

The Signal Office can tell the course of all regular storms, but occasionally there happens an irregular change, which is analagous to this running of water down hill, as seen in the course of almost every river large or small in the world.

In conclusion, I repeat there is no other reliable process than that of the Signal Service system, whereby we may foretell the weather. All other known systems, if I may so designate or honor them, whether founded on the conditions of the moon, the habits of animals, the relation of the other planets to the planet on which we live, or the guess-work founded or unfounded on the weather of previous years—all these I hereby pronounce the merest nonsense, if not something worse—and that all these things are unworthy of any man who makes any pretense to scientific knowledge or claims any standing in advanced society.

From Kansas City *Medical and Surgical Review*, No. 5, May, 1860: The amount of rain which has fallen since the first of January, 1860, is 6.60 inches, a smaller amount than has fallen here, in the same length of time, in any year since 1854, when there was absolutely no rain from June until October.

From a clipping of a Kansas City paper, September, 1860: August 21st, 1860, at the chemical works, Waltham, Mass., the rain gauge showed a fall of 5½ inches of water in a little over an hour.

THE BAROMETER.

SOME CONSIDERATIONS IN REGARD TO A VARIABLE SCALE OF PRESSURE PER SQUARE INCH FOR THE BAROMETER AT DIFFERENT HEIGHTS.

BY C. A. SHAW, U. S. SIGNAL OBSERVER, MADISON, WIS.

LOCAL SUMMARY FOR JUNE, 1880, MADISON, WIS.

DATE.	*Mean Daily Barometer.*	*Mean Daily Thermometer.*	*Rainfall or Melted Snow—Inches.*	*Prevailing Direction of Wind.*	*Weather.*
June 1	30.095	58.7	. . .	nw	Fair.
2	29.992	60.5	1.20	sw	Cloudy.
3	29.958	67.0	. . .	s	Fair.
4	29.687	65.7	1.03	se	Cloudy.
5	29.370	69.5	1.22	s	Cloudy.
6	29.419	59.5	.46	w	Cloudy.
7	29.888	63.2		w	Fair.
8	29.880	64.7	. . .	s	Cloudy.
9	29.656	71.7	.57	se	Cloudy.
10	29.793	76.5		se	Fair.
11	29.850	80.0		s	Fair.
12	29.782	79.0		sw	Fair.
13	29.800	72.2	.47	nw	Fair.
14	29.751	53.0	3.47	ne	Cloudy.
15	30.018	61.2	.20	ne	Fair.
16	30.189	68.0		nw	Fair.
17	30.177	71.7		se	Fair.
18	30.194	71.0		sw	Fair.
19	30.186	72.5		n	Fair.
20	30.094	76.0		w	Fair.
21	29.972	76.7		sw	Fair.
22	29.859	77.2		sw	Fair.
23	29.816	78.7		s	Fair.
24	29.752	74.0	.14	s	Cloudy.
25	29.750	74.0	.03	w	Fair.
26	29.812	75.7		e	Fair.
27	29.699	71.7	.19	s	Cloudy.
28	29.736	65.5	.14	nw	Fair.
29	29.805	65.0	.19	w	Fair.
30	29.873	68.7		sw	Fair.
Sums	. . .	. . .	9.31	. . .	. . .
Monthly Mean	29.861	69.6	. . .	sw	. . .

TEMPERATURE, BAROMETER AND WIND.

June, 1880.	Highest Temperature.	Lowest Temperature.	Range of Temperature.	Barometer—Rising or Falling.	MILES WIND. From Noon to 6 p. m.	From 6 to 12 p. m.	Midnight to 6 a. m.	6 a. m. to Noon.	Total Miles Traveled.	Maximum Hourly Vel.
1	69	50	19	. . . . . High	100	62	35	28	225	15
2	72	53	19		49	47	43	74	213	32
3	75	55	20	. . . . . F	79	65	49	69	262	18
4	72	59	13		80	37	63	89	269	23
5	74	63	11	. . . . . Low	86	90	125	93	394	50
6	72	58	14	. . . . . R	115	140	116	90	461	38
7	70	51	19		182	118	36	22	358	7
8	74	56	18		28	25	17	31	101	18
9	79	61	18	. . . . . F	67	89	78	69	303	19
10	84	71	13	. . . . . R	56	58	44	47	205	16
11	87	71	16		59	43	28	41	171	14
12	87	74	13		67	45	58	51	221	15
13	71	66	12		66	41	57	49	213	28
14	78	50	21	. . . . . F R	52	16	68	80	216	24
15	70	52	18		102	97	75	78	352	18
16	77	56	21	. . . . . High	83	40	40	29	192	8
17	81	62	19	. . . . . F	23	6	15	15	59	5
18	78	64	14	. . . . . R	20	20	19	12	71	7
19	83	63	20	. . . . . High	19	24	18	13	74	6
20	84	67	17	. . . . . F	19	15	14	18	66	5
21	84	68	16		21	18	5	25	69	9
22	86	68	18		40	30	48	49	167	10
23	88	69	19		55	38	52	78	223	16
24	82	69	13		66	39	47	40	192	18
25	84	67	17	. . . . . R	55	44	28	28	155	12
26	84	67	17		42	37	32	22	133	7
27	81	68	13	. . . . . F	19	25	43	48	135	24
28	72	62	10	. . . . . R	60	32	40	98	230	24
29	74	59	15	. . . . . F R	81	48	36	39	204	30
30	79	56	23		54	33	24	32	143	12
Sum	. .	. .	. .	. . . . .	1845	1422	1353	1457	6077	. .
M'n	78.4	61.8	16.6	. . . . .	61	47	45	49	203	17.6

Mean daily barometer, 29.861. Humidity, 71.4.
Highest barometer, 30.251 (19th).
Lowest barometer, 28.986 (6th).
Monthly range of barometer, 1.265.
Highest temperature, 87 (11 and 12th).
Lowest temperature, 50 (1st and 14th).
Monthly range of temperature, 37.

Greatest daily range of temperature, 23 (30th).
Least daily range of temperature, 10 (28th).
Mean of maximum temperature, 78.4.
Mean of minimum temperature, 61.8.
Mean daily range of temperature, 16.6.
Total rainfall or melted snow, 9.31 inches.
Prevailing winds, southwest.
Maximum velocity and direction, 50, south (1:15 a. m., 5th).
Total movement of wind, 6,077 miles.
Number of cloudy days on which rain fell, 9.
Number of cloudy days on which no rain fell, 0.
Number of days on which rain or snow fell, 16.
Rain or snow preceded by wind from southwest, 4 times.
Rain or snow preceded by wind from south, 3 times.
Rain or snow preceded by wind from southeast, 3 times.
Rain or snow preceded by wind from east, north and west, each once.
Clear days, 0; fair, 21; cloudy, 9.
Mean of barometer, corrected for temperature only, 28.938.

THE BAROMETER.

During the past month, the steadiness of the barometer was most noticeable. From the 16th to the 21st it was almost motionless with the least possible wind during that time. Even during the excessive rainfall of the 14th the barometer was of nearly normal height, and stationary. But then it is to be noticed that the wind was moderate in force and amount, while during the heavy wind storms of the fifth and sixth the variation was very great.

The barometer is a most valuable instrument, but the usual legends affixed, of wet and dry, and changeable, are mostly hypothetical. It merely measures the pressure of the air at the moment of reading. These, compared with other readings, may give data for deducing probable changes, but alone they are exceedingly vague. Consider that the amount of rain which fell in this vicinity upon the 14th would have made a solid block of ice with a square base the size of the park, three feet thick for every mile. What sustained this tremendous weight before the storm it is difficult to conceive. If the air rushed in to fill the space before occupied by vapor tension, destructive winds might have been expected. If the elastic force of the vapor exactly compensated for diminished pressure before, while the solid air compensated afterward, this implies two elements whose action upon the barometer are so similar as to make the real cause undiscoverable. There is certainly in most cases a great loss of power which, by calculation, should be expended.

For example. The force required to sustain a column of mercury 27.97 inches in height is 14.73 pounds. This is about half a pound per square inch of mercury. If during twenty-four hours the barometer should change an inch, this would give a total variation in pressure equal to about seventy-two pounds

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per square foot. The pressure of wind at different velocities is something like this: Two pounds per square foot for a velocity of twenty miles per hour, eight pounds for forty miles, eighteen pounds for sixty, thirty-two for eighty, etc. Seventy-two pounds for twenty-four hours would be three pounds per hour, equal to about twenty-five miles. Now, although twenty-five miles is accounted a fairly strong wind, it cannot be doubted that above the earth and free from obstructions, the velocity is greatly above this with a change of barometer of an inch. It seems hardly too much to calculate it as three or even four times as great. A scale might be constructed something like this:

Pressure of the wind above a place, free of obstructions, when the barometer at the surface was between

29.00	and 30.00	inches—	2	pounds	to the	square	inch.
28.00	" 29.00	"	—1.75	"	"	"	"
27.00	" 28.00	"	—1.57	"	"	"	"
26.00	" 27.00	"	—1.31	"	"	"	"
25.00	" 26.00	"	—1.20	"	"	"	"
24.00	" 25.00	"	—1.10	"	"	"	"
23.00	" 24.00	"	—1.00	"	"	"	"
22.00	" 23.00	"	—0 90	"	"	"	"
21.00	" 22.00	"	—0.81	"	"	"	"
20.00	" 19.00	"	—0.73	"	"	"	" etc.

This may be an exaggerated scale but, the principle seems to be correct. That the pressure of an elastic medium like the atmosphere would be very excessive in the high regions of the scale and of much diminished power in the lower, seems natural to conclude. Imagine how weak the force of the wind that corresponded to a pressure of mercury one inch in height, for while one inch of mercury weighs as much as another the wind producing power of the air at different pressures must vary.

Seemingly opposed to such a scale is the fact that the measure of the wind does actually correspond nearly with the barometric change. Take an actual case: At 6:00 a. m., June 6th, the barometer read 28.986, equal, we will say, to a pressure of 2086.56 pounds per square foot. At 6:00 a. m., June 7th, the barometer read 29.882, equal to a pressure of 2151.36 pounds per square foot, a difference of 64.8 pounds; about 2.6 pounds to the hour for twenty-four hours, about twenty-three miles. Though variable, of course the wind record from 6:00 a. m., June 6th to 6 a. m., June 7th, was 426 miles or about eighteen miles per hour, equal to a pressure of 162, a loss of five miles per hour, though as the wind was variable, running up at one time to thirty-eight miles, this loss may be excused or laid to natural obstructions at the place of observation. But it will be seen by looking at the scale of pressure and velocity that a running up of the force to forty or fifty miles quickly exhausts the pressure which the change of an inch implied. Besides which, this would not explain variations in force which occur at different portions of a storm's progress, while the barometer change remains nearly uniform.

It may easily be imagined that some compensatory phenomena transpire to prevent the very destructive winds which this implies; perhaps by *opposing* pressure, as, in mechanics, the exhaust of a low pressure engine is made to add to its working force. The means of determining vapor tension by the hygrometer are imperfect; but if it is this influence which affects the barometer it shows why local observations are so unreliable, for after all, to one dependent upon his own weather-glass, the following are about all the rules that have been given to guide him.

1. If, after a continuance of dry weather, the barometer begins to fall slowly and steadily, rain will ensue; but if the fine weather has been of long duration, the mercury may fall for two or three days before any preceptible change takes place, and the more time that elapses before the rain comes the longer the wet weather is likely to last.

2. Conversely with regard to a rising barometer and fair weather.

3. If the change ensues immediately it will not be permanent.

4. If, though rising steadily for two days together or more, it rains, yet fine weather may be expected; though if it begin to fall upon its appearance, the fair weather will not be permanent, and conversely.

5. Sudden falls of the mercury in spring or autumn, indicate wind; in the summer, during hot weather, a thunder storm; in winter, a change of wind with a thaw and rain, but in a continued frost, a rise indicates approaching snow.

The difference in value of these indefinite rules to a system of actual measurement of atmospheric phenomena, embracing a large extent of the earth's surface, can be readily perceived. Yet additional instruments are certainly desired; self-registers, delicate and reliable, and with the barometer, an associated instrument to define these disturbing elements which compensate, disadvantageously for scientific purposes, the actual changes of pressure which we know are continually taking place.

ELECTRIC ECCENTRICITIES.

Mr. James Johnstone sends to the *Edinburgh Daily Review* the following interesting account of the effects of a thunder-storm observed on the 7th ult. He says:—"On the 7th ult., about 4:15 p. m. the lightning struck the craig which is named on the plan of Edinburgh 'The Dasses,' which overhangs the Hunter's Bog on the east. The results are so extraordinary that they are worthy of notice in your columns. The rock struck is of the hardest basalt, commonly called whinstone, The lightning did not strike the sharp, serrated, front edge of the craig, as might have been expected; but, on the contrary, it struck the flat top covered with sod at a distance of three feet from the present edge, and that must have been between six and eight feet from the edge before the accident; for the lightning detached several tons of the rock from the front of the craig, and sent six large masses of rock down into the Hunter's Bog. The largest of these meas-

ures four feet long by three feet broad and one foot thick, but of irregular shape. On the edge of the craig the lightning detached a mass of rock, which now stands in a very precarious position. This large mass measures four feet nine inches long by three feet broad and one foot four inches thick. The top of the craig, a short distance from the front of it, is covered with a coating of angular pieces of basalt, and on the top of these a covering of sod. It was on the sod the lightning struck, and made a hole two feet six inches long by one foot six inches broad. The largest diameter of the hole is in a direction from N. W. to S. E. and the lightning continued its course in this direction, ploughing a furrow in the sod for a distance of nineteen yards, the furrow diminishing in width as it receded from the original hole, where it measures five inches wide. These facts establish the direction in which the lightning came, and correspond with the observations of three gentlemen who were in a house on the west side of the Hunter's Bog, and saw the lightning pass across the Bog to the rock on the east side, namely from N. W. to S. E. In the *Times* of the 14th of October last, notice was given that a committee of scientific gentlemen had been appointed by insurance and other companies to investigate the effects of lightning with a view to providing the best means for protecting buildings, and a request was made that all persons who could furnish information on this subject would do so. In consequence of this notice I wrote a letter to the *Times* on the 25th of October, containing the following information, which it is important persons should know who wish to watch thunder-storms, and give the information asked. There are three kinds of thunder-storms. First, those that take place between clouds, the lightning flashing from cloud to cloud; second, storms in which the lightning comes from the clouds down to the earth; third, storms in which the lightning passes from the earth to the clouds. It is the two latter kinds of thunder-storms which affect the question of the protection of buildings. The damage done to them and to trees by lightning varies in a remarkable manner, according to whether the lightning went from the earth to the cloud or from the cloud to the earth.

"The lightning which struck the Dasses Craig has an important bearing with reference to the protection of buildings from lightning. The common theory is that lightning will always be attracted to strike the highest or most prominent point in its vicinity. The Dasses Craig is near the bottom of the valley, bounded by Salisbury Craigs on the W. and S., and Arthur's Seat on the E. High land and prominent rocks surrounded this craig on all sides, and yet the lightning passed all these and descended into the valley to strike it.

"Another interesting fact. On placing a compass near the hole made by the lightning I found that the needle deviated from N. to E., and when the compass was in the hole, the needle stood at E. S. E., instead of N., proving that the rock was still powerfully electrical at the spot where the lightning struck it. But, except in the vicinity of the hole, the craig did not affect the needle."—*The Telegraphic Journal.*

THE METEORIC SHOWER OF AUGUST 18, 1880.

PROF. S. A. MAXWELL, MORRISON, ILL.

On the night of the 10th of August the earth in its orbital revolution passed through the "meteoric zone." Observers throughout the country were on the lookout, and when twilight came had everything ready for conveniently noting each phase of the anticipated phenomena. From personal observations of this and several other meteoric showers of corresponding date, I am prepared to say this was one of the most interesting that has occured for several years. From 9.30 until 10.00 P. M., the number of meteors, according to the best estimate I could make, was six per minute.

For a time after ten o'clock the numbers preceptibly diminished and near midnight again became more numerous. I regret that I could not observe this interesting phenomenon after midnight, for without doubt the finest part of the display took place at that time.

In point of numbers, the display of 1880 as I observed it was not inferior to that of 1875; but in brilliancy it fell far below it. The larger number of meteors on this occasion, seemed to be in the direction of Ursa Major. I saw nothing unusual in regard to their apparent velocity or the direction of their flight. Very few of them were either marked by any red color or left any visible train of light.

Quite a large number of meteors were visible on the evening of the 11th, also on the 9th, some of which surpassed in brilliancy any that appeared on the night of the 10th.

I have neither the ability nor the disposition to enter into any speculations concerning these erratic bodies. Although much has been learned and satisfactorily explained regarding their composition, a definite knowledge of their origin has not yet been obtained.

PHYSIOLOGY.

DR. TANNER'S FAST.

(CONCLUDED.)

In our last number we gave the details of Dr. Tanner's fast up to the thirty-second day, at which time he had lost 30½ pounds in weight, but was in other respects in fairly normal condition. During the remaining eight days his condition, in brief, was as follows; Thirty-third day—weight 126½, pulse 78, temperatue 99°, respiration 9½; thirty-fourth day—weight 126½, pulse 78, temperature 99½°, respiration 14; thirty-fifth day—weight 126, pulse 78, temperature 98°, respiration 14; thirty-sixth day—weight 126, pulse 74, temperature 98°, respi-

ration 14; thirty-seventh day—weight 125½, pulse 74, temperature 98¾°, respiration 14; thirty-eighth day—weight 123½, pulse 78, temperature 99¼°, respiration 15; thirty-ninth day—weight 122½, pulse 91, temperature 97°, respiration 13; fortieth day—weight 122, pulse 92, temperature 99°, respiration 17.

Thus terminated one of the most complete and satisfactory tests of human endurance ever witnessed, for though many cases have been reported in which abstinence from food has been protracted even beyond this, still there have been in none of them so strict a watch kept or so accurate tests made. As has been said by a well known writer: "The question of fasting is one of physiology. It is best explained by an examination into the nature of those animals that indulge in hibernation, as it is termed, almost, as it would seem, by instinct. The term means 'wintering,' but hibernation is practiced by certain creatures as much in summer as in winter. It would appear to be a plan devised by nature to enable animals that cannot change their *locale* readily with the changing seasons, to exist without food during the periods unpropitious to their obtaining it. Bears, bats, hedgehogs, the dormouse, water rats and certain insects are all addicted to this practice, but not alone in winter. The bat hibernates once every twenty-four hours, exhibiting all the customary phenomena of the condition. Not to be too scientific, it may be said that these include respiration and augmented irritability as attendant factors. Birds have high respiration and little irritability; reptiles are the reverse in this. In structural changes—as from the egg to the bird, the tadpole to the batrachian and the larva to the chrysalis and insect—respiration is augmented; in physiological changes, as in sleep and hibernation, it is lessened.

In winter the swallow and bat migrate to warm regions, while the insects—their natural prey—sink into a deep sleep through the season of cold and famine. With those animals that hibernate the question of fasting is necessarily involved with that of sleep. Yet there have been instances in which the latter condition was not certainly prominent. The capacity for existing without food would appear to depend on the ability of the heart to carry on the circulation of the blood without regard to the arteries. The blood in that case is venous and not oxygenated. In hibernation disintegration and waste of the tissues progress very slowly, and the animal is enabled to live on the slow consumption of its own tissues. Bears that come out after hibernation are found to be wasted greatly from this cause, and it is considered a positive evidence against the faster in cases of long abstinence from food being pretended, if he do not display this waste of his superabundant fat. It is, therefore, obvious that this condition of inactivity and that of a high temperature are of advantage to the voluntary faster. The consumption of tissue goes on less rapidly under those circumstances, and he is enabled to utilize the waste for the sustenance of his own life."

The period of forty days seems to have been regarded in Biblical times as within the possibilities, although evidently far beyond any custom or requirement of the Mosaic law. Moses, on Mt. Sinai, and after his descent therefrom, Elijah on Mt. Horeb, Jesus in the Wilderness, are marked instances of fasts of this du-

ration. In modern times numerous cases are on record where religious enthusiasts have imitated the example of those sacred personages, but success has been rare.

The experience of physiologists, derived from the most careful and accurate experiments carried on for centuries by the most scientific men of succeeding periods, proves beyond question that the average man cannot live without food more than about ten days, and those persons and those editors of newspapers who think and say that this feat of Dr. Tanner's upsets the theories and reverses the teachings of physiologists and medical men, merely show their ignorance of the amount of labor, time and skill bestowed upon by such men their researches.

To the question *cui bono?* so often propounded during Dr. Tanner's fast, there have been many answers offered, the principal of which amount to this: 1st, We all eat and drink too much; 2nd, Fasting may be employed as a therapeutic agent. To the first of these it may be replied that to eat too little is at least as direct a violation of the laws of nature as to eat too much, and to the second it may be said that from the days of Esculapius until now, the best physicians have prescribed fasting in all diseases or injuries of the stomach or intestines, as well as in many other diseases of an inflammatory character.

Among the best articles that we have seen on this subject is one in the *Scientific American*, which we copy:

"That his experiment is not altogether useless, as is maintained by some, we will try to elucidate, notwithstanding we agree that the sacrifice and danger he exposes himself to appear so great that it is doubtful if they will be compensated for by the physiological and pathological lessons to be learned by it.

His fast has, in the first place, proved the mistake of those who judged all men alike, and reasoned that, because a weak, hysteric, and ill fed girl of 18, perhaps consumptive besides, died within two weeks from starvation, as soon as she was carefully watched, therefore nobody could be without food for a period of forty days, forgetting that the case is quite different where we have a man of between 40 and 50, the age of maximum resistance, a man well fed, of whom the weight is far above the average for his size, and who was provided with a copious layer of adipose tissue around his body, a man who had practiced fasting for sanitary purposes, finding it the best way for him to cure gastric derangements, for which he had a liability, and who had gradually increased the time of fasting until, at his last fast in Minneapolis, he had extended it to forty-two days. This was not believed, and deception suspected, hence a challenge of $1,000 if he succeeded when carefully watched. Dr. Tanner accepted, but the challenger backed out under some pretext, and Dr. Tanner, to save his reputation and prove his theory, came on and submitted for nothing to the task under the eye of careful watchers.

It must be conceded that few persons would possess such a strong will and determination to persist in subduing all appetite, and disregard the no doubt exceedingly disagreeable and perhaps distressing feelings consequent to total abstinence from food; but Dr. Tanner possesses this determination in the highest

degree, and he never thought of cutting the fast short, whatever may sometimes have been the opinion of his watchers.

In order to understand what may be learned from this experiment we will, for the benefit of the non-professional reader, remind him of a few physiological principles.

The chemical constituents of the human body have to be constantly renewed, and the waste has to be supplied by the food. Some of these constituents are wasted rapidly, others slowly, and in case of starvation the elements rapidly wasting away must be present in the body in sufficient quantity to keep the functions of life in operation. These rapidly wasting constituents may be divided into three classes, those in which carbon prevails, those in which nitrogen, and those in which phosphorus is the prevailing element.

The carbonaceous compounds are wasted in keeping up the animal heat. This is accomplished by a slow combustion, that is, a combination of the carbon with the atmospheric oxygen, which is continually going on in the capillaries through the whole body, the oxygen being furnished by the blood, which absorbs it into the lungs, and which by the arteries is sent through the body. The product of this combustion, the carbonic acid, still absorbed in the blood, is by the veins sent to the lungs, where it is given off and escapes in the act of respiration. After having stripped Dr. Tanner, when he commenced his fast, for the double purpose of ascertaining his physical condition and leave no doubt that he had no food about him, it was seen that he had plenty of fat in and around his body to furnish carbon enough to last him more than forty days.

The second element of rapid consumption is nitrogen; it proceeds from the waste of the muscular tissue, which is always going on, even during sleep, as the heart is a muscle continually contracting, and respiration is kept up by muscular action. The blood takes up this waste in the form of a compound, of which the chemical name is cyanate of ammonia, but which by physiologists is called urea. It is the function of the kidneys to secrete this from the blood, and numerous experiments have settled the nature and amount of this secretion, which in healthy persons consuming food, varies from 25 to 35 grammes every twenty-four hours. When Dr. Tanner began his fast it was secreted at the rate of 29 grammes, and as the nitrogen in any excess of nutrition is similarly changed and secreted, it was expected that a large reduction would be observed as soon as the fast began to have effect on the system. This expectation was realized, and the amount soon fell off to 23, 20, 17, 16 and finally 13 grammes, at which it remained stationary, with slight oscillations beyond. This amount of nitrogenous substance represents, therefore, the waste necessary to sustain the functions of life, and would at once be increased in case food was taken by the experimenter, at least nitrogenized food, such as beef extract or its equivalent, albumen, casein, milk, etc., the only substances which would be of benefit to him. Analytical chemistry, therefore, acts here as a reliable detective, and to the credit of all concerned it must be said that never the least suspicious increase of urea was observed, it

remaining very nearly constant, and will no doubt become double and more as soon as after the fast food is again taken.

The third element of rapid waste is the phosphorus; it proceeds chiefly from the waste of the brain and nervous tissues. It is so important in these functions that a great German chemist has formulated the expression, "without phosphorus, no thought." Every mental act and every nervous excitement is accomplished by a consumption of phosphorus, which, combined with different bases in the body, especially soda, magnesia, and lime, is secreted by the kidneys as a soluble salt, not only easily detected as crystals by the microscope in the sediment, but even an approximate estimate may be had of its reduction or increase by the number of crystals seen in the field under the same circumstances.

This third element did not at first show any reduction in quantity, but, to the contrary, for a few days some increase. It was at the occasion that Dr. Tanner had been unjustly accused by a physician present that he had surreptitiously accepted food from one of the watchers; this appears to have preyed upon his mind. Attention was therefore called to the danger in this direction, a danger proceeding from the more rapid waste of the nervous system. Relaxation was therefore devised, and daily carriage rides, which eased his mind and were followed by a more sound sleep, soon reduced the phosphates secreted, and at the same time reduced the irritability and temper of the experimentor.

The observation tallies perfectly with what has been observed in the case of such clergymen who have every week the periodical labor of preparing and delivering two sermons on Sunday. Chemical analysis has proved that at that time they secrete more phosphates than in the middle part of the week, after the rest of Monday and Tuesday.

Looking the whole case over, including the feasting as well as the fasting, we are inclined to regard the Doctor's individual stomach as the most remarkable organ on record. That he could, by mere force of will, compel it to do without food for forty days, is, in our judgment, far less remarkable than that he could, at the end of that time, when it had, ostensibly, become so sensitive as not to be able to endure even a few spoonfuls of water, with impunity stuff it with an incongruous and incompatible mass of milk, watermelon, peaches, oysters, bananas, beef, etc., etc., and that, too, without a sign of resentment from it.

The principal lessons, if any, to be learned from this feat are, that occasional men can do like the prophet Elijah, who, before his fast on Horeb, "did eat and drink, and went in the strength of that meat forty days and forty nights;" *i. e.*, they can fill up like sponges and live upon their own gradual waste, like bears and ground-hogs, or like an old log slowly rotting in a forest; that some men have a vast deal more control of their wills than others; and finally, that some men have stomachs and absorbents that can withstand treatment which would prove fatal to most human beings. Taking this view of the case, it is very clear that had Dr. Tanner remained quiet, instead of taking his walks and rides, he could have easily have extended his fast for another ten days by living on the tissues wasted by this muscular action.

XUM

EXPERIMENTS IN ABSTINENCE FROM FLUIDS.

PROF. E. T. NELSON, OHIO WESLEYAN UNIVERSITY.

Dr. Tanner has well-earned the title of the "Fast-Male," by his remarkable experiment and its successful termination. As illustrating the power of the will over the physical nature of man, the experiment is the most important ever recorded. The Doctor seems to have gained nourishment as well as consolation from a sip of ice water.

The details of an experiment of an exactly opposite character may not be without interest. In 1878 Mr. Charles King, a student of this university, had his attention called to the subject of water as an article of diet and to the writings of our leading physiologists on this subject. He found Dalton saying, "Water is probably the most important substance to be supplied with constancy and regularity, and the system suffers more rapidly when entirely deprived of fluids than when the supply of solid food only is withdrawn."

Flint claims, "the body only requires not less than three pints of water to two and a half pounds of meat, bread and other solid food daily."

Mr. King resolved to avoid the use of all fluids in his diet in order to test the effect upon his system. The experiment began on the first day of September. The weather was very warm and sultry. The diet consisted of bread with a little butter, meat and potatoes, but no tea, coffee, milk, water, gravy or other fluid. His appetite, only moderate at first, increased regularly during the whole time of the experiment. His pulse was low but very regular, and the general tone of the system good. At the end of thirty days he gave up the investigation because informed by his friends and physicians that it must prove injurious. During the first week in October he drank very moderately of water, consuming during the seven days exactly one quart. He then resumed his experiment for another thirty days, only under a more complete supervision of his diet, so as to avoid the use of any article that contained much water. During this month he took no fruit, nor vegetables of any kind except potatoes. No special change in his symptoms or feelings was observed during the second experiment. After the first few days all sensation of thirst disappeared, and as Mr. King expressed it, "I never felt better in my life."

During the whole period of two months he took much exercise and was a close faithful student. It should be stated that just before entering upon these investigations Mr. King had used milk and water very freely, perhaps to the extent of two quarts per day.

August 7, 1880.

ASTRONOMY.

PLANETARY PHENOMENA FOR SEPTEMBER, 1880.

BY W. W. ALEXANDER, KANSAS CITY.

Mercury, during this month, is in an unfavorable position for observation, except in the beginning, when it may be seen before sunrise in the morning.. It rises on the 1st at 4 hours and 18 minutes a. m., Kansas City mean time; sets on the 30th at 6 hours 4 minutes p. m., and is in superior conjunction with the sun on the 17th 3 hours a. m.

Venus may be seen in the evening twilight during the entire month. It sets on the 1st at 7 hours and .05 minutes p. m., 30th at 6 hours 33 minutes p. m. On the 7th it is in close conjunction with Mars, being only 31 minutes of arc north of that planet (or about the diameter of the moon).

Mars being too near the sun and nearly at its maximum distance from the earth shows to a poor advantage. It sets on the 1st at 7 hours 11 minutes p.m., on the 30th at 6 hours 00 minutes p. m., and is in close conjunction with Mercury on the 28th; distance 6 minutes of arc north.

Jupiter, together with its four moons, forms a superb object for the telescope during this month, rising as follows: On the 1st at 8 hours and 4 minutes p. m., on the 30th at 6 hours and 5 minutes p. m.

The moons, as they course round the primary in their orbits, present some interesting phenomena, of which the following are the most important to be observed at Kansas City. On the evening of the 3d at 10 hours and 34 minutes, the 3d satellite may be seen to emerge from behind the body of Jupiter or re-appear after occultation.

On the 5th at 11 hours 27 minutes p. m. the 2d satellite may be seen to enter on the planets' disk, preceded by its shadow, 1 hour and 36 minutes, both of which can be seen on the disk of the planet at the same time.

On the 7th at 00 hours 28 minutes 11 seconds a. m. the 1st satellite will suddenly disappear by entering the shadow of Jupiter, and will reappear, coming from behind the planet at 3 hours 24 minutes a. m.

The same occurs again on the 8th, the reappearance being at 9 hours and 50 minutes p. m.

On the 10th the 3d satellite enters the shadow of Jupiter and disappears at 9 hours 00 minutes 32 seconds p. m., and reappears at 11 hours 28 minutes 51 seconds p. m., and remains visible 23 minutes and disappears behind the planet's disk for more than two hours.

On the 12th the 2d satellite again makes a transit together with its shadow

as on the 5th. On the morning of the 14th the 1st is again eclipsed. And on the evening of the 14th the 2d satellite reappears after occultation, at 11 hours, 11 minutes.

On the 15th, 8 hours, 51 minutes, 32 seconds, the 1st satellite is eclipsed as on the 7th. Similar phenomena to the above happens on the 16th, 17th, 19th, 21st, 23d, 28th, 29th and 30th.

Saturn forms another imposing object for examination this month. Rising as follows: On the 1st, at 8 hours, 36 minutes, p. m.; on the 30th, 6 hour, 36 minutes, p. m. The southern surface of its rings being now presented to the earth, we look down, as it were, from an elevation of 15 degrees above the plane of the rings.

Uranus is badly situated for observation, being in conjunction with the sun; it rises on the 1st with the sun; on the 30th at 3 hours 47 minutes, a. m.

Neptune rises on the 1st, 9 hours, 15 minutes, p. m., and on the 30th at 7 hours, 19 minutes, p. m., and is nearly at its maximum brightness, but needs only be looked for with a telescope.

Our Moon is in conjunction with Mercury on the 3d, Uranus and the sun on the 4th, Venus and Mars on the 5th, and passes 6 degrees, 57 minutes north of Jupiter on the morning of the 20th, 3 hours, 6 minutes, and reaches Saturn 11 hours, 17 minutes in the evening of the same day, passing to the north 7 degrees, 41 minutes, and on the morning of the 21st at 4 hours, 34 minutes. Neptune lies to the south 5 degrees, 43 minutes of arc.

A NEW PLANETARIUM.

The old-fashioned orreries, which were constructed to show the arrangement of the solar system and the motions of the planets around the sun, were somewhat rude in their mechanism, and were apt to mislead from the conspicuousness of the rods and wires by which the astronomical movements were imitated.

Signor N. Perini, an Italian long domiciled in London, and whose name is well-known as a successful teacher for the civil service and the army, has invented a new planetarium which is free from most of the defects of its predecessors.

A high circular chamber or box, standing on twelve wooden pillars, is erected in the midst of an ordinary-sized room, with a ceiling higher than usual. On entering underneath this chamber, and looking up, a dome is seen, deep blue, and sprinkled with stars. The chief northern constellations are in their proper places, and round the base of the dome are the names of the signs of the zodiac.

Suspended from the top of the dome by a narrow tube is an opal globe, lit inside with gas, and representing the sun. From wires almost invisible the planets are suspended around the sun, of sizes and at distances approximately proportionate to the real sizes and distances, and each having the proper inclina-

tion to the plane of its orbit. The various moons are in their places, and Saturn has his rings.

Thus far, however, all these miniature celestial bodies have been in a state of quiescence. Presently Signor Perini, by simply turning a key, sets the solar system in motion, slowly or swiftly, as he pleases. The sun turns on his axis, and the planets revolve around the sun in proper elliptical orbits, which are traced around the inside of the dome, which is 14 feet in diameter at its base and 14 feet high. By an ingenious watch-work arrangement inside the earth, which is the size of a walnut, our world is made to revolve on its axis, which latter always points to the same quarter of the heaven. In like manner the moon goes round the earth.

The machinery is arranged in the chamber above the dome, clock-work being the motive power, the originality in the arrangement being the method by which the inventor effects the elliptical motion of the planets. Not a sound is heard; the machinery works, like its great prototype, in solemn silence.

Signor Perini, who has been prompted to this work solely from the enthusiasm of a mechanician, has devoted his nights and mornings to this structure for seven years, and has spent on it about £700. The earth alone cost £40. The planetarium can be made of any size, from the dome of St. Paul's to a little thing that might be used for school instruction. It is now standing at 77 Newman Street, Oxford Street.—*London Graphic.*

GEOLOGY.

GEOLOGY AND EVOLUTION.

BY THE LATE PROF. B. F. MUDGE.

CHAPTER VI.—ARTICULATES.

CRUSTACEANS.—TRILOBITES.—DEFECTIVE RECORDS.

The fourth sub-kingdom of animated nature, the Articulates, appears with the first fossils of the lower sub-kingdoms, at the opening of the Silurian Age. By the symmetrical laws of evolution, these should have made their appearance only after time had allowed them to become developed from the lower sub-kingdoms. It is also not a little remarkable that with the first evidence of any of this division we find distinct traces of a class of animals whose bodies had no solid substance. The trails of worms (Annelids) with casts of their burrows remain to show their existence, and 185 different species have been described from the Silurians. Their existence affords us another significant fact, that animal life however soft or frail, may show its character, even from the oldest geological

strata. It tells us that we have a right to expect, in some way, the trace of any class of animals that has been an inhabitant of our planet.

Ostracoids appeared with the worms, and with their minute, frail shells have existed through all geological periods.

Let us now examine a single form of Crustacean through a long geological period, and see the progress or want of progress, which it may make in the scale of being. Taking one of the earliest and most common, in species and individuals and most widely disseminated, we will examine its history. This is the Trilobite. It is seen in all the twelve distinct regions of the Silurian, represented by hundreds of thousands of well preserved specimens. It is found in the lowest beds of the Cambrian and abounds till the close of the Permian. There are about two thousand known species, but all are characterized by three lobes in the body—a buckler, also divided into three lobes and compound eyes. They are equally well characterized by an absence of any *fossilized* organs of locomotion, though from their known relations to other Crustaceans they must have had them.

These traits they retain in all the varied species throughout their long geological life, ending with the highest strata of the carboniferous age; or covering nearly three fourths of the whole of the earth's geological history.

The Trilobites are not the lowest of Crustaceans, but of "highly complex and specialized types, and remote from the embryonic stages of the group to which they belong."* They border on the Tetradecapods or middle rank of the subkingdom, but in all this long period of existence they never became Tetradecapods, or, in short, anything but Trilobites. There was time enough, and change in the earth's condition sufficient to have shown evolution, if it had been a law of nature. The Trilobites, according to Dana's time ratios then existed 37,500,000 years without losing their characteristic forms.

It is a cardinal principle of evolution that "the use of an organ developes it."† The Trilobites in common with all other Crustaceans must have had organs of locomotion, and some faint impressions on sand are supposed to have been made by their feet; but these organs were so thin or foliaceous that they have never been found fossilized, and this, too, at a time when rain-drops were imprinted on the rocks, and are seen to-day so delicately outlined that even the direction of the wind is known that attended the shower. Now if use of legs develops them, surely during 37,000,000 of years or as many generations, they should have become sufficiently firm to have left their shelly structure, or at least the impress of their feet beside the rain-drops.

The arm of the blacksmith is indeed stronger for its use, but a life-long hammering adds no new muscle to it, and leaves so slight a mark on the bone that the anatomist cannot enter the catecombs and select a humerus, and say, "This is from a blacksmith," even though, as in Europe, father and son for many generations follow that employment.

*Dawson.
†Thomsson.

It is claimed that the later Trilobites are somewhat more highly organized than the earlier; but Barrande on the other hand says, that those of the first or oldest Trilobite fauna, of the Silurian, rank above those of the second or more recent fauna. No proof exists, according to the same authority, that one genus has been derived from another.

Against this strong array of geological facts, which we have given in the preceding pages, so adverse to the doctrine of evolution, it is urged and objected that the geological record is exceedingly imperfect, and if no fossils were missing we should have evolution in all its phases. That this record, as we now know it is opposed to their theories, Prof. Darwin and his associates freely admit. He candidly says: "But I do not pretend that I should ever have suspected how poor was the record in the best preserved geological sections, had not the absence of innumerable transitional links between the species which lived at the commencement and close of each formation, pressed so hardly on my theory."‡ We admire the free, frank honesty of Prof. Darwin, that in his estimation, the strongest proof of the defectiveness of the record, consists in the fact that it does not agree with, but is antagonistic to his theory. If it is so defective, should not evolutionists and anti-evolutionists both wait till a better knowledge of these records shall be obtained from the rocks of the unexplored portions of the earth? If we had supposed this record were as deficient as Prof. Darwin concludes, we certainly should not have written this brief essay, endeavoring to show that its facts did not accord with evolution.

But is the record of the rocks so deficient? We have now 50,000 known and described species of fossils. Deducting the plants (6,000) and the articulates, and we have about 40,000, representing the four sub-kingdoms of Protozoans, Radiates, Mollusks and Vertebrates. Agassiz,* a few years ago estimated the living representatives of these four sub-kingdoms at 45,000, of which less than 30,000 had been described. Here, then, we have a fossil representation of species even larger than the living which have been described. But as there were, during the long geological ages, many more species than those living at any single period, we may estimate the total extinct of these four sub-kingdoms at 200,000, or at most 300,000 species. Are not the 40,000 species, scattered from the Archæan to the recent, likely to give us a fair representation of the varied life which covered that whole lapse of time? Does not our knowledge of the living fauna teach the same fact? We certainly had a correct knowledge of the zoölogical features of South America when our naturalists had described one-tenth of its fauna. The first explorers of Australia reported a fair synopsis of the peculiarities of the zoölogy of that region, ere they had penetrated fifty miles from the sea coasts.

So, while we have a meager list of the animal life of the carboniferous age, no one doubts that we possess a correct idea of its peculiar fauna. A perfect list of all its mollusks, insects and reptiles would not be likely to enlarge our

‡Origin of Species, Chap. X, p. 282, Amer. Ed.
*Principles of Zoology, p. 27, Edition of 1871.

XUM

knowledge of the true feature of the animals, which pervaded its oceans, swamps and forests. We have probably a small list of its plants, but no one supposed that dicotyledons flourished in that era. The labors of the past thirty years have tended to push back in geological strata some forms, but has not shown a change of type. Reptiles are now known to be older than when our list was half as numerous, but the forms are no lower. The pines are now gathered from the upper Silurian, when not long ago we had found them no lower than the Upper Devonian. But the normal trunk, fruit and cell form do not differ from the two horizons.

While in every locality some breaks are found in the geological deposits, yet the missing portions, to a very great extent, are seen in other countries. In Russia there is a blank between the upper Carboniferous and Permian, but in Kansas and Nebraska no such imperfection occurs, and the fossils pass from the lower of the one to the higher strata of the other. The great divisions of the geological formations in Europe are not tne same as those in America. The three epochs of the Tertiary in the former, become four in the latter, thus helping the defective record. Some of the American are fresh water deposits, synchronous with those of the salt water of Europe. According to Cope and Hayden, there is an unbroken continuation of the deposits of the Cretaceous and Tertiary ages, "establishing an uninterrupted succession of life across what is generally regarded as one of the greatest breaks of geologic time." * * * Types of lizards and tortoises continue, like the crocodiles, from the Mesozoic to Tertiary time without extraordinary modification of structure."†

But this "uninterrupted succession of life," connecting these two ages, covers the spot where we should find the missing links, which should, according to the theory of evolution, show the ancestry of all our extremely diversified mamal life of the early Eocene; yet, not a trace of any has been found. The great variety from Lemur to Marsupial, in the latter formation, demanded nearly as much variance of form in the connecting deposits, and thence shading backward to the primitive type as low as the Ornithorynchus.

Those who contend that our mammals are derived from a more simple quadruped should produce the facts which show it. Should true mammals or a high connecting form of marsupials be hereafter discovered below the Eocene it will then be soon enough to consider what theory they will sustain. We apprehend that they will be more likely to show forms as diverse from each other as the members of the Tertiary fanna.

The Wealden epoch in England and similar deposits in the "Foot-Hills" of Colorado very nearly cover the chasm which exists in other parts of the world between the Jurassic and Cretaceous. Thus we have a continuous succession of land through that portion of the earth's history in which are the records of all the highest members of the animal and vegetable world.

Our American fourteen divisions of the Silurian and nine of the Devonian

†U. S. Geological Survey of Colorado, 1873, p. 442, Hayden.

do not cover the exact divisions of those formations in the old world, as given by Lyell. Even in the United States, what is wanting in one section, is, in part, supplied in another.

Had not the 10,000 species described from the Silurian failed to show the missing links to sustain the theory of Prof. Darwin, neither he nor any of his followers would have supposed that they were not a fair and full representation of all the types that existed in that geological age. Nearly 1,000 species of plants are known from the Carboniferous, and there is no probability that any new type of vegetation will be found in it. With all the numerous and extremely diversified genera and species of reptiles from the Mesozoic, more varied than all the living, does any one expect that a more perfect list will change the characteristic feature of the age of reptiles? If the reader will look at tables one and two, page 19, or tables eleven and twelve, page 60, he will see the extreme difference between theory and known fact. The most sanguine evolutionist and most earnest pleader in favor of the imperfection of the geological records must admit that there can be little if any possibility that nature has made so imperfect a record of her doings as to leave us a history so entirely different from her true operations. The discrepancy is too broad and too deep to admit a probability that all the fossils showing evolution have been destroyed, while such a large number, covering the same periods, have been preserved as a record against it.

THE LOESS OF THE WESTERN PLAINS—SUBAERIAL OR SUBAQUEOUS?

BY A. L. CHILD, M. D., PLATTESMOUTH, NEB.

The geologists of the day are divided in opinion as to the method of deposit, of the Loess formation of the western plains. From the earlier observations of this formation by geologists till quite recently, the idea seemed generally, at least tacitly, to prevail, that like the large portions of the earth's crust, it was deposited under water, or was subaqueous in its formation.

Nevertheless it was frequently noticed and recorded, that wherever the formation was exposed the evidences of stratification were very obscure, if not entirely wanting.

The position taken by Baron Richthofen, that it was a product of the winds brought in from surrounding lands, or of subaerial formation, induced more active thought and inquiry on the subject.

Positive evidence of stratification, although earnestly sought for, eluded observation; and yet a deposit of the depth of the Loess from 150 to 200 feet, or in fact of any depth, distributed over such an immense surface, so nearly approaching a water level, indicated no hitherto observed or known action of wind.

In the great cutting for an approach to the west end of the C., B. & Q. R. R. bridge, over the Missouri, at Plattesmouth, this question is most conclusively

solved. This cut, of upward of 2,000 yards in length and ranging from ten to ninety feet in depth, is entirely in the Loess formation. A portion of the excavation was made during the months of November and December of 1879, under very unusual circumstances. It was very dry, and yet there was a succession of a number of long mist-like rains. And during this period of these rainfalls there was hardly any perceptible wind.

The rainfalls were simply sufficient to moisten the smooth sides of the cut, without any wash, or disintegration of the surface. The result was an oxydized effloresence of minerals unequally distributed, at different horizons. This oxydation produced distinct color lines, clearly revealing stratified deposits of from three to twenty inches in depth.

Subsequent heavier rains, with winds, largely mixed and removed these colors; yet some still remain quite distinct after an exposure of from three to six months.

Since reaching the grade level (some sixty days), several rather severe storms have fallen. The line of the cut, somewhat tortuous, offers faces, on the one side or the other, to any and all points of the compass. And those portions of the walls which have been subjected to a certain kind and amount of wear from these storms, exhibit clear and distinct lines of stratification; their lines of softer material being removed from between the different strata of from three to fifteen inches in depth.

Portions which have exhibited these lines clearly, are now by further action so far broken down and disintegrated that they yield no evidence of stratification, thus exhibiting the method by which all lines in exposure of this formation have been obscured. Many of these strata, under the peculiar action of the storms, are again subdivided into deeply cleft paper-like thicknesses.

Near the east end of the cut is a very interesting exhibition of the debris of an ancient iceberg. This debris so far as exposed (the cut passing through one side of it), is in a conical heap of ten feet in height, and about eighty feet in diameter. The material is of such a diversified character as could only be obtained by a very long travel as a glacier, till it reached the shores of the great lake which then covered these Loess plains; into which it fell, after the manner now frequently seen, on the coasts of Greenland, of the glacier breaking from the mass and floating off on the ocean as an iceberg. So this glacier became an iceberg and floated southwardly, till it was stranded at this point; and here in time dissolved and deposited this as yet unknown amount of debris.

The remains of this iceberg give us both indirect and direct evidence of our theory of subaqueous deposit. Indirect—by this proof of an extensive inland water, on which alone this berg could be transported. And direct, by the distinct lines of stratification, both in colors and weathered lines, passing conformably over this mound of debris.

Any honest doubter of the subaqueous theory can drop his doubts into the debris of the past on a brief examination of the evidence which this cut now exhibits.

EXPANSION OF CLAY.

From proceedings of the Institution of English Civil Engineers, March 26th, 1879:

In railroad tunneling, timbers were frequently broken by the expansion of clay, although it appeared quite dry.—*Hawkshaw.*

In Primrose Hill and the Kilsby tunnels, if the cutting was left a few days without completing the brick arching, the timbers were broken. The expansion seemed to be nearly the same, whether caused by the air as in the former case, or by the water as in the latter instance.—*Mr. Foster.*

That in the Box tunnel it was usual to leave six inches for expansion between the face of the work and the timbers, and that space was scarcely sufficient.—*Mr. Thompson.*

Had seen, at Richmond, a well of four feet in diameter, completely closed in one night by the swelling up of the bottom, although there was not any water in it.—*Mr. J. Simpson.*

The first stone bridge ever constructed in England was that of Bow, near Stratford, in 1087: the next oldest was London bridge, constructed in 1176.—*English Paper.*

ETHNOLOGY.

THE DECREASE OF THE NORTH AMERICAN INDIANS.

It is an almost universally received statement that, ever since the first contact of the whites and Indians, the latter have been steadily diminishing or disappearing. The matter has elicited repeated comment on the part of thinking men and philanthropists in this and other countries. It has furthermore formed no uncommon theme of earnest debate and somber prevision among the Indians themselves. And yet to ascertain the exact truth in the case is no easy task. Ignorance of the real facts has given rise to much of general assertion and idle sentimentation, and with the unthinking, careless or unmeaning generalities have come at last to be accepted as definite and indubitable data. A few additional words, therefore, upon this subject may not be altogether inappropriate.

That there has been in case of perhaps every one of the best and longest known Indian tribes a decrease, in many instances startling in its apparent rapidity, no one attempts to deny. Still the true rate of decrease is generally greatly exaggerated. The number of the aboriginal population in earlier days has been almost universally overstated. In the mind of the European explorers the vast expanse of the country seemed naturally to corroborate the boastful

claims made by the Indians as to their numbers. Hence the comparison of tneir numbers as reported by these explorers, and subsequently by those who have simply repeated their estimates, with their now more accurately ascertained numbers makes the rate of decrease appear much greater than it actually is. In close connection also with this fact it must be remembered that the Indians (*as Indians*) are not a prolific race. To one at all familiar with Indian life and history this is a most obtrusive characteristic. With the normal birth rate continued it is that under the most favorable circumstances in their mode of life the numerical increase of a tribe from generation to generation would be very perceptibly below the ordinary rate of increase among the whites. Notwithstanding their constitutional vigor and permitted polygamous life, the children of an Indian family that survive infancy rarely number five, and quite usually are only two or three. And the statement admits of demonstration that at times tribes in a state of ordinary prosperity scarcely more than hold their own from year to year in point of numbers.

Again, in some cases small tribes and remnants of tribes, instead of perishing utterly, as is often stated of them, are merely incorporated into the larger contiguous tribes and so disappear only in name. In frequent individual instances, too, Indian blood is simply absorbed by the whites. Whoever is conversant with the older and more recent Indian history and border annals meets constant evidence of such incorporation of Indian blood into white stock. Personal observation in all parts of the country presents not infrequent illustrations of the same fact. The degree to which this silent transference has occurred is far higher than is usually supposed.

But after all, the considerations just adduced do not invalidate the fact of a significant decrease among the Indians; they only call for an abatement in the rate. And this brings us to the real question, why is this decrease? What are the active causes that have borne part in producing it?

Undoubtedly the most noticeable agency has been war among themselves and more especially with the whites. Warfare is the Indians' inspiration, his chief avenue to tribal position and influence. In his view, life and warfare are quite interchangable terms. Their wars with each other, however, though incessant, are seldom bloody or to any considerable extent destructive of life. The Indians' proverbial fear of death is generally a sufficient motive to him to forego the shedding of the blood of an enemy wherever it seems likely to involve too great a peril of his own life. Intertribal warfare, therefore, consists mainly of petty forays, made by small parties or single individuals, and entailing comparatively unimportant destruction of life. To be sure there are instances where entire tribes are reported to have been annihilated, but these are exceptions. Such destruction has had place, if at all, only where combined action on the part of many, a rare event among Indians, has been made against the few; or where both sides have been encouraged or supported by outside influences. It is rather their wars with the whites that have proven disastrously destructive. The com-

bined and long continued operations of the latter are at once impossible to them and altogether disconcerting. Statistics show that they have been fearfully reduced by this means. Their diminution in battle and indirectly by consequent famine and exposure has been enormous. The habitual secretiveness of the Indian renders it extremely difficult to carefully estimate these losses; but the lapse of time displays their magnitude only too distinctly. It must be borne in mind, moreover, that the losses of declared hostilities, great as they are, constitute but a small part or the actual losses inflicted upon them by the whites. The quiet taking-off of an Indian here and there by the irresponsible frontiersman has in the aggregate reached an almost incredible figure.*

To such a degree has this unreported decimation of Indians prevailed that universally they are now become extremely reluctant to place themselves in immediate constant contact with the whites, even under the most solemn assurance of amity and protection.

The crowding of the Indians in the advancing occupancy of their domain by the whites has been another important cause of decrease to them. The restriction of their wanted limits rendered their former active life a self-support by the chase impracticable, while as yet no adequate encouragement or assistance in the adoption of new modes of life, made necessary by their changed circumstances, was afforded. Hence was engendered a life of idleness, mendicancy and dissoluteness—a most fertile source of decay. Almost constantly during the past one hundred years our frontier has been beset with a pale of degraded, diseased and perishing red men of this description. Pressed back by the encroachments of civilization from their original homes, and not able successfully to maintain their new ground against wary assaults from its former occupant they are surely (and not slowly) borne onward toward extermination. Disregarded by the whites and despised by the adjacent wild tribes they have realized but too clearly that there was no place for them, and with perhaps fitful remonstrances have submitted hopelessly and aimlessly to the inevitable. Experience seems to indicate that when once the Indian has reached this state there is scarcely any help—his doom is set as he is consciously and almost willingly hastening toward it. The census of such tribes, as annually taken, is sufficient witness to their decline. A single illustration of this assertion, afforded within the last half dozen years, may be cited. One of the most robust and spirited tribes of the West has decreased 40 per cent. since 1874, in consequence mainly (if not entirely), of the limited and almost helpless conditions of life that have been forced upon them by the government.

*To learn what is the prevalent animus of the borderer toward the Indian one has but to refer to the discussions of the vexed *Indian question* constantly appearing in the journals of the frontier States. The general tone of feeling there evinced is decidedly inimical to them. Witness the following from the California correspondence of the New York *Tribune*, September, 1859: "The federal government committed a great mistake ten years ago in not ordering a large military force to this State, with orders to hunt and shoot down all the Indians from the Colorado to the Klamath. This would have been the cheapest method of managing the Indian affairs of California; and perhaps the most humane ——. The fact is that every wild Indian in the State must die ——. It is supposed that ten years ago there were 60,000 Indians in the State; to-day there are not 10,000." Compare Harpers Monthly, vol. 23, pp. 312-13. Unfortunately the press of the older States too often lends its sanction (perhaps unintentionally) to teaching of this character.

Cognate and suggested by the foregoing has been a more subtile but very powerful influence,—discouragement. The lack of organizing and recuperative faculty in the Indian has been frequently remarked. He seems incapable of unintermitted activity and complex combinations. Even periods of success are with him, inevitably followed by long lapses of relaxation and almost demoralization, when all his energies of both mind and body seem unstrung and insusceptible of reanimation. Much more is this the case in the presence of a long series of disasters and discouragements. More or less this fact of a general dispiritedness is become prevalent among all the Indians of our present territory. It may not at first acquaintance be noticeable, for as occasion requires the Indian can be a diplomat of no mean order; but to one long familiar with them in their daily life and thought it is a most impressive and unavoidable conviction that they are disheartened. Their ambition as a race is fast disappearing and their hope almost perished. In intimate intercourse they make no secret of acknowledging it. The first chief of one of the most important of the tribes dwelt with a peculiar earnestness upon this fact in a final interview between himself and the writer two years since, and his mind was the mind of the many. It is exactly this unf rtunate mental status that is working lamentable results upon many of the Indian tribes, while in this attitude a quite ordinary ailment frequently proves fatal. A slight epidemic will carry off great numbers. Children that grow up receive as their most direct inheritance this incubus of hopelessness and are thereby quite incapacitated for aught of successful effort toward their own improvement or the amelioration of the condition of their posterity. The temperament of the Indians has become uniformly melancholic, and those among them, who possess the most of native ability and from whom we should naturally expect the best and largest efforts for good, are the very ones in whom this type of temperament is most emphatically present. I do not remember to have seen this phase of Indian character particularly noticed; but it deserves careful consideration from all who are sincerely interested in their welfare and advancement. Perhaps it would be as well not to inquire too curiously into the course of events that has brought about this special mental attitude in them. The exact truth might not be entirely flattering to our humanitarianism.

Of the deleterious efforts of strong drink and of certain forms of disease communicated to the Indians by the whites it seems scarcely necessary to speak. Their victims are to be numbered by thousands. The sale of liquors to the Indians is now by the wise, but inefficiently administered policy of the government somewhat checked; but it is by no means stopped. One of the most frequent cases before the federal courts, sitting in the vicinity of any Indian reservation is that of the United States *vs.* A B for selling liquor to Indians. By various avenues considerable quantities continue to reach them and its use still operates to their no small detriment. No doubt it is only a very broad euphemism that the stuff thus illegitimately bartered to the Indians may be dignified by the name of liquor; for in more than one instance it has been found by actual

test to be a vilest concoction of nauseous and most deadly drugs. The unwholesome effects of such beverage may be readily imagined. Of disease the scrofulous taint has been the most malign. Some medical authorities claim that there is scarcely an Indian within the confines of the United States whose system is not to some extent infected with it. This is certainly an extravagant generalization; but the bare fact of its being ventured is evidence of the general prevalence and insidious virulence of this type of disease. The frequency of various strumous symptoms, and the development of the V-shaped jaw in some tribes; and the alarming mortality among all Indians, of such diseases as affect particularly the glandular system, are momentous indications in the same direction.

Obviously this is a catalogue of adverse influences that might well break the most buoyant and elastic constitution. The Indians have borne up against them with a surprising persistency, but the struggle has been unequal. The magnitude of the Iliad of their woes may be inadequately determined by the fact that in nearly every instance they have lost ground. In the greater number of cases they are still losing ground. The only question now before the friend of the Indian is whether this state of things shall continue; whether the decay shall be suffered to go on practically unhindered till most of the present tribes pass out of existence and become matters of interest solely to the philologist and inquisitive historian.*

Nominally the question was decided years ago. Philanthropists have devised and applied not a few schemes for the saving and civilization of the Indian. But in practice, with here and there a remote exception, the choicest schemes have proven altogether nugatory, if, indeed, not prejudicial. The Indian, as a class, remains still hopeless and helpless. To him, as also to his would-be benefactor, the experience of the past is not remarkably encouraging.

Now, of means possible for the correction of the abuses under which the Indian is losing ground, as I have endeavored to show, there appear to be but two. I. The official, which involves a complete reconstruction of our administrative policy with regard to them. The radical defect of the administration of Indian affairs hitherto has been that in their direction the goverenment has in fact, if not in principle, acted toward them as though they were a temporary burden incident to the acquisition of our newer territory, and its duty was simply to render easy their passage out of existence and not rather to elevate them into the only true existence—that of a man among fellow men. A pupilage, such as their present condition is sometimes complacently termed, lacks the one essential element of a true pupilage: it is not a state of preparation for better things. It is, so far as concerns the Indian, a perpetuity, ending only with his existence.

*I am aware that the statement here offered will receive a prompt rejection from a considerable number of those who have made Indian history and affairs a topic of long and critical investigation. Quite recently there has sprung up a strenuous tendency to go to the other extreme and claim that the Indians are in the main steadily increasing. I believe the truth lies between. There are noteworthy instances of increase; but there are undoubtedly more that show a decrease. I have in this paper purposely refrained from giving lists of statistics, that I might not trespass necessary limits; but I have also carefully refrained from stating aught that might not be verified by copious data.

The control of his interests is erected into a separate bureau which has no organic union nor necessary interdependence with the life and general civil interests of the country. On the contrary, its dealings with the Indians have in not a few instances been so conducted as to bring their interests into apparently direct conflict with the general interests of the community. In fine, the Indian bureau has come to be spoken of and is systematically treated as a most undesirable public burden Instead of there being any well organized and sustained effort to identify the Indian with, or to prepare him for entrance into the body politic as a useful vital force, the general tendency of our present system is to keep him distinctly and emphatically debarred from most of its special privileges and immunities. And not only is this true as related to the direct work of the government with the Indians, but in practice the spirit of its policy has paralyzed nearly every effort from other sources (as charitable societies) in their behalf. The material surroundings and conditions in which they are kept by the government will not admit of nor sustain the Indians' essential moral elevation.

Whether a reorganization of our Indian policy is practicable, as public affairs are now administered, is a grave question; if not, it is a vital weakness. What is required is a system which shall have as its only aim the fitting of the Indian for an early investiture with the full rights of citizenship, and the moment he becomes such, that he comes to realize that he has a rightful place as part of the State, it is not consonant with the laws of human nature that he should continue to decline. To fully discuss this phase of the Indian question would require a volume. My only desire here is to mark it as having been an element in hastening the Indians' decay.

II. This is a most important factor in the consideration of our subject; yet it is one that is difficult of a proper presentation. I do not flatter myself, moreover, that it will at first blush secure any very extended acceptation. The measure here suggested is to be gathered from the last cause assigned for their decay. If it is undeniable that Indian blood has become corrupt by the admixture of a vitiated blood from whatever source, then it is physiologically a most natural method that it might be reinvigorated by the infusion of a new, untainted element, and the problem becomes much simpler if the strain thus engrafted is from a superior stock. Historically it may be accepted as demonstrated that the sturdiest and most persistent types of the human family have often sprung from the union of two differentiated stocks, the one of which presents the highly organized, intense element, while the other affords the heavier physical stamina. Fortunately we have afforded us excellent and abundant illustration of this very phenomenon in Indian history. The old *voyageurs*, the *courieurs des bois*, and even the more unadventurous of the French pioneers of Canada, who chose the prosaic life of farmers, in considerable numbers formed alliances with native women. From this diverse parentage has sprung a large portion of the present population of Canada. Even in the older and more densely settled districts of the Dominion the greater part of the population (excluding recent immigration)

still shows evidence of Indian blood; while in the vast Manitoba region the entire body of the inhabitants, farmers and hunters, is of this mixed descent. As to the physical powers and development of the hybrid stock (except where the offspring of vagrant intercourse) the testimony of experience is uniformly favorable. They are a robust, enduring people among their neighbors of pure white blood, with the Indians on the other hand they stand deservedly high. Alexander Henry, in his travels of 120 years ago, reports a Knistenaux chief as saying that the half breeds excelled the pure Indians, both as hunters and warriors. Among the Indian tribes of the West and Northwest it is no unusual thing to-day to meet chieftains and distinguished braves in whom white blood is easily discernible. The excellent characteristics derived from the healthful intermingling of the races are so marked as to warrant the designation of the descendants by eminent authorities as a new and persistent variety of man.

It is just herein, I am persuaded, that we shall find a real and possible solution of the somber problem of the steady diminution of the Indians. The policy of the Canadian government, while the French regime continued, at least indirectly encouraged this blending of the white and red races. Peter Kalm, a most extensive and critical observer, in his narrative does not scruple to commend the system. No doubt it would meet much earlier and ready application with the facile Frenchman than with the more unyielding Saxon; but it evidently is not impossible. That it has occurred, and with beneficial results in case of some of the southern tribes, was sufficiently presented in a paper in a previous number of this journal (November, 1879). In these tribes the preponderance of white blood is more manifest with each succeeding generation, and ultimately it will completely absorb or assimilate the Indian element. The same event would occur with our entire Indian population were the blending once to begin under favorable circumstances. The Indian would disappear, but only in name. Whatever of vital force or quality in him is worthy of conservation would survive and enure to the advantage of the dominant race.

It seems, therefore, that it were become a fit question whether it may not be made a matter of governmental consideration or policy with us to encourage some such system. Certainly the conviction is gaining strength in the minds of most intelligent men who have longest been intimate with the Indian's condition and needs, that such a blending, under suitable limitations, is desirable and for the Indian necessary; without it our Indian policy must remain an anomalous *imperium in imperio*, a prison-house system alien and repugnant to our national instinct and finally ruinous to the Indian.

JOHN B. DUNBAR, Deposit, N. Y.

CORRESPONDENCE.

SCIENCE LETTER FROM PARIS.

July 30, 1880.

Professor Vogt has drawn the attention of the National institute of Geneva, to the physiology of writing. It has been demonstrated that certain parts of the brain, situated in the region of the temples, have a predominating influence on the formation of articulated language. It is also well known that the nervous fibers inter-cross in the brain, and in such a manner, that the movements of the left arm are commanded by the right hemisphere, while the movements of the right arm are ordered by the left hemisphere of the brain. Apoplectic attacks and extravasations of blood, are more frequent in the left, than in the right side of the brain. Hence, when the left hemisphere is affected, paralysis and the impossibility to speak result for the members of the right side, while any lesion in the right hemisphere, resulting in paralyzing the left members, generally leaves language intact. Now since a center existsf or language, does one also exist for writing? and since we are accustomed invariably to write with the right hand, the power to do so ought to be paralyzed when the left lobe of the brain becomes attacked. But we can learn not the less to write with the left hand; this raises a general question: Does the manner in which we write depend on physiological necessities created by the structure even of the brain itself? All peoples write with the right hand; how then comes it that the arrangement of the lines and letters be different?

The nations of Eastern Asia write from top downward, and in lines from right to left; Semitics and Europeans place the lines one below the other, but the former shape the letters from right to left centripetally, while the latter do so from left to right and centrifugally. The arrangement of the lines and letters and their formation, are independent of each other; it is the form and size of the letters that constitute individuality. The representation of an object by an image was the origin of writing; the knotted strings in use with the Aztecs was rather an aid-memory than a form of writing; besides, to make a knot on a handkerchief to sharpen the memory, is not uncommon among moderns. The Mexicans have a combination of image and phonetic writing, suggestive of a rebus; the Red Indians when they paint images on skins, differ in little from the races that did the same on rocks. The style of primitive writing depended on the material; on a cornice, the lines were horizontal; vertical on a pillar; circular round a column. Naturally on a pillar the writing would commence from the top downward.

The Arabs and Mussulmans when writing, keep the hand fixed to the same spot, while the other—the left—gently pushes or spins the paper forward, from left to right. The Arabs also prefer to write while standing up, besides, the

Koran enjoins that the right hand ought to remain motionless when writing. Easterns could never have written with the left hand, for that hand has ever ranked as impure. No Turk strokes his beard with the left hand, or employs it to receive food, and to present that to be shaken, ranks in the eyes of westerns as an insult. With a Semitic, every religious action is accomplished with the face turned toward the east; his prayer would be worthless if uttered in any other position; he observes the same rule in writing, so that the light arrives from the south, and he writes from that point to shadeward. Westerns receive the light on the left side, and curiously enough, write also toward the shade. Both are physiologically correct in not writing in full light. A singular fact to note: an individual struck with paralysis, experiences ever afterward an inability to pronounce certain letters, *f*, *l*, *r*, for example; the correlation will extend to the incapacity to write these letters, a simple crook is at most all that can represent them. Naturally, as observed, the right hand predominates; this was the case in the time of Homer's heroes, and was so with their ancestors; and modern man writes easily, and as rapidly, as a musician's fingers move unconsciously, because the images or letters are stored in the left hemisphere of the brain. Left-handed penmanship is only right-hand writing topsy-turvy; this explains the eccentricity of Leonard de Vinci's explanations of his designs, and that puzzle so many persons; he wrote upside down at an early age, and continued the freak when residing in France. Many lithographers at present write on the stone with the left hand and draw with the right.

Professor Vogt concludes, that the position of the lines in writing and reciprocal arrangement of the letters, depend on no physiological necessity.

M. Hëbert has been studying what was formerly the geologic condition of the Straits of Dover, and concludes that during the first phase the tertiary period, a part of the Straits was covered by the German ocean, which communicated with the basin of Paris by the plains of Artois, while it also extended to Belgium, Westphalia and Hanover. He fixes the opening of the Straits, during the quaternary period.

Professor Daubrée claims for Descartes, the honor of being one of the creators of cosmology and geology, he had been replaced by Newton and Voltaire. Before Laplace, Descartes cousidered all celestial phenomena as simple deductions from the laws of the mechanics; he proclaimed the physical unity of the universe, before the spectroscope had revealed the chemical composition of the most distant worlds, and that the earth and the heavens are made of the same matter. Heat, according to Descartes, played a rôle capital in the formation of our globe, which was at one time a star, differing in nothing from the sun, save in being smaller, and that the dislocations in celestial vault have been produced by coolings and contractions. The idea that igneous, or crystallized rocks were at one time stratified till coming in contact with the internal heat of the globe, they became volcanic, has been abandoned since the explorations of Humboldt in the Andes, and of De Buch in Norway; the latter found crystalline rocks lying over

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stratifications, the same in the Tyrol and in the Canaries—proofs of the subterranean activity of the earth. Cordier, also concluded from the increasing temperature of mines with their depths that the mass of the globe was still in a fluid state. M. Elie de Baumont has based his vast system on this crust of the globe contracting by cooling. He astonished scientists also by asserting that the oldest mountains, were not the highest, and that little hills in Britany and Wales, were older than the Alps and the Andes. The classification zoölogic and the classification by systems of dislocations and upheavings, to-day march side by side. Professor Daubrée points out that by no means can feldspar or analogous silicate rocks be formed independent of heat, that the fissures in the rocks filled with metals, have been in intimate relationship with the internal regions of the globe

M. Perroncioto has made some further researches as to the cause of the anemia which affects the workmen in the St. Gothard tunnel. He found the patients were invariably suffering from quantities of worms, like small eels, whose presence sufficiently explained the malady. The same diagnosis was observed in the case of the men who bored the Frejus tunnel.

Teeth have a very intimate connection with health; bad teeth imply a bad stomach, and a stomach which functions badly contributes to caries and the loss of the teeth. From the very earliest history, the preservation of the teeth occupied attention. Homer, Hesiod, Euripides, etc., constantly allude to the subject. In the law of the Twelve Tables, it was prohibited to bury the dead with gold, except when that metal served to bind the teeth. Cascellius, the famous dentist at Rome, left, when dying, a fortune greater than that of a pro-consul. Tooth preservatives or powders, were also in great request in ancient Greece. Young ladies ever had a portion of myrtle, the shrub sacred to Venus, in their mouths, and St. Clement blamed the ladies of his day for their coming to the temple with their mouths full of the drug mastic. The adult has sixteen teeth in each jaw, the child but ten, till seven years of age. A tooth consists of the crown which extends outside the gum, the neck, which is covered by the gum, and the root, which occupies the socket. The tooth is hollow, and filled with a pulp; closed toward the crown, but open at the roots to allow the nerves and blood vessels to ramify. Three different tissues compose the teeth: the ivory or dentine, which exists at the root, as well as at the crown, and forms the principal part, it is not bone, as many think, though it has the same chemical composition, no vessel penetrates it, and it has neither medullar sap, nor pores, it consists of of layers, one over the other, and hardened even at the moment of formation. Next, the enamel, which covers the crown of the tooth, and that resembles not a little porcelain, the shade varying with the temperament of each individual. It is so hard as to resemble blue steel, it marks the best files, and will strike fire with steel, like a flint; third, the cement, which covers the tooth, and thicker at the root than at the neck. The teeth live and grow by means of their pulp, a matter extremely sensitive, and when inflamed, very painful, in consequence of the impossibility to augment its volume, being narrowed in on all sides by the

ivory. It is to the sensibility of this pulp, that we immediately feel the least differences between heat and cold, and the slightest shades in the food masticated. The incisors have only a crown and a root, and constantly grow, as in the case of rabbits and other gnawing animals; they cut the food, while the canine teeth tear it. The "wisdom tooth" has roots and a crown less developed; its form varies, and it appears at no fixed age; when it has no room to develop, grave results may ensue. When, through age, the teeth disappear, the form of the jaw bones alter, and impart a change to the physiognomy, the lower jaw bone inclines backward, as with infants, and the chin becomes pointed. Teeth grow irregularly from various causes, and the best period to correct the defect is between ten and fifteen years of age. For persons who have acid stomachs, and which thus favor the destruction of the enamel, alkaline drinks ought to be patronized, and alkaline powder, containing a little magnesia, employed. Caries can be either dry or humid—the former, often suddenly stops of its own accord, but commences by a black spot, and marked sensibility to heat and cold. When the disease eats into the pulp, the tooth ache appears in a most violent form. When caries appears, food should not be partaken of when too hot or too cold; brushes rather soft than hard, ought to be employed; alkaline powders are excellent for combating the acid of the saliva—one of the chief causes of caries—as stringent preparations fortify the gums. When the teeth are lost, they ought to be replaced, not only in the interest of pronunciation, but in that of digestion, for on the efficacy of the latter a prolongation of our days depends.

There are numerous thermal stations, spas in Europe: England has eight, Germany seventy-two and France 116. What is chiefly to be kept in view, is not the quantity of mineral matters in solution, but their quality. There is no classification for natural mineral waters. Their production is one of the most interesting problems of geology; the mineralization is effected under the influence of heat and pressure; is in connection with the nature of the soil, and is associated with chemical reactions as complicated as they are obscure. There is much difference in composition of springs in point of yield, temperature and richness of solution, and they have a relationship with barometrical oscillations and earthquakes. The Lisbon earthquake affected all the thermal springs of Europe. However, the best known mineral waters have a very stable and ancient origin.

THE SIXTH SENSE.

Dr. Hughes Bennett, Professor in Edinburgh University, lately read a paper before the British Association of Science, wherein he announced that the tendency of modern physiology was to ascribe to man a sixth sense. If there be placed before a man two small tubes, the one of lead, the other of wood, both gilded over so as to look exactly alike, and both of the same temperature, not one of the five senses could tell the man which is lead and which is wood. He could tel this only by lifting them, and this sense of weight was likely to be recognized as the sixth sense.—*Scientific American.*

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BOOK NOTICES

THE SKIN IN HEALTH AND DISEASE: By L. D. Bulkley, M. D., Philadelphia: Presley Blakiston, 1880: p. 148, 12 mo., 50 cents.

This is number ten of the American Health Primers, which have proved so timely and so successful. The author, who is attending physician at the New York hospital, writes with experience and consequently with a ready pen; dividing his subject into but four chapters, which, however, cover the whole ground as fully and completely as could be asked in a merely popular treatise. In the first chapter he undertakes to combat certain popular prejudices in regard to diseases of the skin by briefly describing the anatomy and physiology of the skin. The second is devoted to directions in regard to the care of the skin in health and for the prevention of disease, and this is the most important of the whole. The third takes up the diseases to which the skin is liable, their recognition and home treatment. The last furnishes directions for diet, hygiene and mode of life, which will aid the physicians in their cure. The author's remarks upon soaps will certainly surprise most readers and should serve to put them upon their guard against the numerous "medicated," "soothing" and "curative" nostrums, which are usually manufactured of the cheapest and most objectionable ingredients and are far more likely to communicate disease than to remove it. It is abundantly illustrated and handsomely printed.

FELTER'S ELEMENTS OF ARITHMETIC: By S. A. Felter, A. M., and S. A. Farrand, Ph. D., New York. Charles Scribner's Sons, 1880, p. 154, 12 mo. Cloth, 30 cents.

Felter's Arithmetics have been used for years in the New York schools and have received the highest commendations from the principals of many of them. Their advantages seem to be the ignoring of theoretical discussions, technical definitions and rules, and the furnishing of a larger variety of practical examples and a closer and improved grading, while the illustrations are marvelously fine for a school book. The charm of the illustrations and the easy and simple steps of the ascent, from the notation one book, two boys, three ducks, four hens and five birds, all depicted in the most artistic manner, to the handling of fractions also illustrated in an equally attractive way, must necessarily beguile the most wary boy into an interested examination and study of the subject before he knows it. The series comprises the above and The New Intermediate, The Advanced and the Complete Arithmetics, all by the same authors and all spoken of, by those who have used them, in the highest terms.

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RECORD OF THE PROGRESS OF ASTRONOMY FOR 1879: By J. L. E. Dreyer, M. A., Dublin, Ireland.

This is a sketch of the principal astronomical events of the year 1879, and an account of the more important and interesting investigations that were made in that year. It is intended as a continuation of the work of Professor Holden, of the U. S. Naval Observatory, who has for several years prepared such a paper for the Annual Record of Science and Industry (now discontinued). In this account of the world's progress in astronomical work it is gratifying to notice that the labors and investigations of the observers of the United States occupy a prominent position, and that the names of such western observers as Pritchett, of Missouri, Stone, of Cincinnati, Burnham, of Chicago, and Watson, of Ann Arbor, are mentioned in connection with services of a most valuable character to astronomical science.

THE DATA OF ETHICS: By Herbert Spencer: J. Fitzgerald & Co., 1880, Paper, 15 cents.

This is number 9, volume I, of the Humboldt Library, those preceding it being Light Science for Leisure Hours, by Prof. R. A. Proctor; Forms of Water, by Prof. Jno. Tyndall; Physics and Politics, by Walter Bagehot; Man's Place in Nature, by Prof. T. H. Huxley; Education: Intellectual, Moral and Physical, by Herbert Spencer; Town Geology, by Rev. Chas. Kingsley; Conservation of Energy, by Prof. Balfour Stewart; The Study of Languages, by C. Marcel

Thus it will be seen that for $1.35 one can procure nine first class, standard works by the best writers of the present day, printed in fair type on good paper, while, by subscribing by the year, twenty-four such works can be had for $3.00 per annum.

QUARTERLY REPORT OF THE KANSAS STATE BOARD OF AGRICULTURE, JUNE 30, 1880: J. K. Hudson, Secretary: pp. 119 Octavo.

This valuable work contains, as usual, statistics relative to population, acreage of important crops, railroads, public lands, condition of crops, farm animals, meteorology data, etc., together with the Summer and Fall treatment of orchards and vineyards, the Growing of sorghum cane, and the Habits and transformations of the web worm, the last by Prof. E. A. Popenoe, of the State Agricultural College. This Report is an excellent number, creditable alike to the State and to Major Hudson, the new Secretary of the Board of Agriculture.

CIRCULARS OF INFORMATION OF THE BUREAU OF EDUCATION, No. 2, 1880: Hon. John Eaton, Commissioner: Govt. Printing Office, 1880.

This so-called circular comprises 111 pages and is a Report of the proceedings of the Department of Superintendence of the National Education Association, at the meeting at Washington, Feb. 18–20, 1880.

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This meeting was attended by about sixty-five of the Superintendents of State Boards of Education, Public Schools, Boards and Principals of Seminaries, etc., from all portions of the United States.

Papers upon appropriate subjects were read by Prof. S. A. Butterfield, President Gilman, of Johns Hopkins Union; Hon. C. D. Randall, W. T. Harris, LL. D., and several others, besides discussions of kindred topics, in which most of the members joined.

These circulars contain valuable matter for teachers at all times, and this particular number is especially rich in useful and entertaining articles and suggestions.

SCIENTIFIC MISCELLANY.

MANUFACTURE OF LINEN.

Although the natural appearance of wool might first have suggested its use as a textile and woven material, there is no historic evidence that woolen cloth antedated that of linen. The manufacture of linen dates from the earliest written records. It was well known in the time of Herodotus, and the Egyptian mummies are swathed in linen cloth. With the Egyptians, linen appears to have borne a sacred character, as their priests were forbidden to enter the temples clothed in other than linen garments and their dead were always shrouded in it. In later times linen cloth appears to have been a manufacture very generally practiced among civilized peoples.

Probably because of the superior facility with which cotton fiber can be prepared for spinning and weaving, the manufacture of linen in this country does not seem to have attained the proportions to which its actual value entitles it. The extensive application of machinery to the manufacture of linen is of a comparatively recent date, and even now much of the Irish linen is of hand make, from the pulling of the flax to the finish of the cloth. Massachusetts appears to have led in the linen manufacture in this country. Previons to 1640 the people of this colony imported from England most of their clothing and all of the finer sort; but in that year the Assembly decreed that:

"The Court taking into serious Consideration the absolute Necessity for the Raising of the Manufacture of Linnen cloths, doth declare that it is the Intent of this Court that there shall be an Order settled about it, and therefore doth require the Magistrates and Deputies of the several Towns to acquaint the townsmen therewith, and to make Enquiry what seed is in every town, what Men and Wimmen are skillful in the braking, spinning and weaving, what means for the providing of Wheels; and to consider with those skillful in that manufacture, and what course may be taken for teaching the boys and girls in all towns the spinning

of the yarn, and to return to the next Court their several and joint advice about this thing. The like consideration to be had for the spinning and weaving of Cotton Wool."

The description of cloth to which this order applies appears to have been a mixture of cotton and linen, or linen and wool, known as "linsey-woolsey." A subsequent order offered "a bounty of three-pence on every shilling's worth of linen, woolen and cotton cloth, according to its valation, for incouragement of the manufacture." New England is also entitled to the honor of the first linen factory, which was established in the year 1737 in "Long Acre,"—Tremont street, Boston. In 1662 the Assembly of Virginia enacted laws for the promotion of the industry of cloth making. Two pounds of tobacco were offered as a bounty for every pound of flax, or hemp, prepared for the spindle, three pounds for every yard of linen cloth a yard wide, and five pounds for every yard of woolen cloth. Every titheable person was required, under a penalty of fifty pounds of tobacco, to produce yearly two pounds of dressed flax or hemp. Flax seed was imported from England and distributed to each county. Denton, in 1670, says of the women of New Netherlands: "Every one make their own linen and a great part of their woolen cloth for their ordinary wearing." In New Jersey, in 1867, Quakers from Yorkshire and London made linen cloth, and in Pennsylvania, in 1693, and in Delaware, at about the same time, one of the principal employments of women was the spinning and weaving of linen, and in New Hampshire, in 1719, Scotch-Irish carried on the business quite extensively.

The manufacture is growing in this country, but not with such rapidity as many other industries. The census of 1870 reports 90 establishments for the manfactures of flax, but how many are devoted to the making of linen cloth does not appear. Of these 90 no less than 46 are in New York. (The census of 1860 showed only ten in New York and Massachusetts.) Ohio, in 1870, had 27 establishments, and the remainder were scattered in five or six other States. The entire number of hands employed in 1870 was 765, the capital invested $524,701, and the annual value of products $815,010. Some interesting facts will be added to the above by the results of the pending census, and it is quite certain they will be much more reliable as data than some which have heretofore been published under sanction of the government.—*Boston Journal of Commerce.*

ADVICE FOR SUMMER WORK.

BY PROFESSOR BURT G. WILDER, M. D.

Notwithstanding the number of "Summer Schools of Science" to be in operation this season, many teachers are likely to pass the vacation at a distance from the facilities afforded by organized laboratories. How shall they employ their time?

Doubtless they all need rest, and in most cases at least a fortnight should

elapse before any intellectual labor is undertaken. An equal period of repose may well occur just before the renewal of teaching in the Fall. But the teacher who hopes to make his instruction each year more thorough and successful than the last, will be pretty sure to spend the remaining month or two in the search of help from books, and, while regretting the vagueness of the information thus obtained, may seldom think of making it more real by personal observation.

Now it is true that in some branches of science this may require appliances not readily obtained. This is the case with Chemistry and Physics, and some parts of Natural History. But Botany and Entomology may be pursued under almost any circumstances, and I venture to suggest that at least one kind of *anatomical* work may be carried on with but a slight amount of apparatus.

Obviously, the summer is not the most favorable time for study of the viscera, while anatomical details respecting the muscles, vessels and nerves are not especially required for ordinary instruction. But the *brain* is not only the organ least satisfactorily treated in the text books, but at the same time the one concerning which the most should be known, from the double standpoint of physiology and psychology.

But how can the teacher procure brains, and how shall he preserve them when obtained?

The question is a perfectly natural one in view of the prevailing impression that the cerebral structure is to be learned from the human brain alone. So far from correct is this idea, that from a single animal brain, perfectly fresh or well preserved, more may be gained than the average medical student learns from the human brains usually examined in the dissecting-room.

This is due to the fact that, excepting the absence of the occipital lobes of the hemispheres, the brains of the cat, the dog, the rabbit and the sheep present nearly all of the structural features of the human brain, while their smaller size and greater accessibility better adapt them for manipulation and for the preservation of the numerous specimens which are needed to display all parts of the organ.

Of the animals above named the cat seems to be the most favorable subject. It is always and everywhere obtainable; the brain is larger than that of the rabbit, and more easily extracted than those of the sheep and most dogs.

Some features of the brain, as the coloration of different parts, and especially the relation of the gray and white substances, are better seen upon fresh specimens; but the beginner will do well to examine hardened brains first, so as to become familiar with the form and relative position of the parts, and with their names.

Among the instruments needed for the removal and dissection of the brain the most essential are a very sharp knife, and a pair of "wire-nippers" with the blades set at a slight angle with the handles.

As an aid to the study of the brain any work upon Human Anatomy will be found useful. The best are those of "Quain" and "Gray." Descriptions,

without figures, of the brains of the sheep, and of the dog and rabbit, are given in the little works of Morrell and Foster and Langley. With some modification these apply to the brain of the cat.

Finally, it is hardly necessary to urge that outline drawings be made of the brain as a whole, and of its parts as exposed by dissection. If this is done, by the end of the summer the teacher will have become better able to appreciate the peculiarities of the human brain when one comes in his way, and will have laid a substantial foundation for the physiological and psychological instruction which he may be called upon to impart.—*Science.*

THE PROPAGATION OF OYSTERS.

At the recent meeting in this city of the American Fish Cultural Association, a paper was read on the propagation of the oyster, by Dr. W. J. Brook, of the Johns Hopkins University. The manner in which this propagation takes place had never before, he said, been thoroughly understood. Through studies made by him last summer, however, great light was thrown on the subject. He found that the American oysters do not breed their young in the shell, as had been supposed, and consequently the eggs can be impregnated artificially. An average oyster contains from six to nine million eggs, and one of large size may contain fifty millions. The plan pursued by him in fertilizing these eggs was to chop the male and female oysters up together; thus the fluids are mixed and the impregnation is made complete. The process of development immediately begins, and goes on so rapidly that a change may be noted every fifteen seconds. In a very few hours the embryo is sufficiently formed to swim in the water. The shells at first are very small, and are not adjacent to each other. They grow very rapidly, closing down over the sides, and finally unite and form the hinge. In the short space of twenty-four hours the young oyster is able to take food, and from three days to a week it attains perfect form. During its early life it is a swimming animal. Tne oyster is able to reproduce its species at the end of a year's growth, and it is marketable at the age of three years.—*Scientific American.*

THE ANGLO-AMERICAN CATTLE COMPANY.

Notwithstanding the rapid development of the trade in dead meat and cattle between this country and America it is probable that the traffic is only in its infancy. To carry on the breeding and rearing of stock in the plains of the far West, in a systematic manner, the Anglo-American Company was established abont a year ago, and it has been working with much energy in thus utilizing the resources of that great expanse of magnificent grazing country. Already the company's manager, Mr. Groom, has secured about 9000 head of fine cattle in Texas at an average of 27s. or say 30s. each; and these are being steadily driven in three great herds, containing something over 3000 heads apiece, towards a point on the

great railway system stretching from the Atlantic to the Pacific, where they will be worth at a moderate computation twenty dollars or £4 per head. According to last reports all three herds had safely passed through the more enclosed and most difficult part of their long journey, and for the rest of the way there was abundance of pasture and water. The land upon which the company's cattle are and will be fed belongs to the United States Government, who allow and encourage it to be occupied in the manner proposed by the company, rent free. The rich prairie on either side of Goose Creek in Wyoming, which is at a convenient distance from the Union Pacific Railroad, has been selected as being the most suitable for the purpose. It is in the heart of the country upon which the buffalo has thriven from time immemorial, and produces sufficient feed to keep cattle fat all the year round. In these districts cattle breeding has up to the present time been conducted by individuals of very limited means, who have nevertheless often secured ample fortunes. The capital of the company, which is incorporated under the Limited Liability Act, is fixed at £70,000 in shares of £20 each, and the unalloted balance is now for a limited time offered at par.—*Iron.*

RUSSIA IN GREECE.

The Russian government recognizing the opportunities presented by the excavations and explorations, now taking place in Greece, has resolved to send some specialists to the very spot of these discoveries. It is also proposed to organize, in a short time, in Greece, a Russian Archæological Institute, in imitation of those of Germany and France. For this purpose, Prof. Skolow has been sent to Athens for four months, and Mr. Ernstaedt, licentiate of the University of St. Petersburg, and Mr. Latyschew, master of the gymnasium at Vilna, have been sent for two years.

BUILDING WITH TEMPERED GLASS.

We have lately entertained our readers about ties of tempered glass for railroads, obtained by Siemen's method. A new application of this method has been pointed out to us which would have appeared incredible at the time, when glass was only known in its primitive condition, as a crystalline product, with sharp, broken edges, yet fragile and unresisting to shocks and pressure. Tempered glass can be obtained in great pieces, gifted with a power of resistance, which its specific lightness, compared with heavy metals, would not have given the least presumption. It can now be employed, notably in carpentry, for posts, joists, ties and buttresses. It combines the advantages of strength and of incorruptibility in contact with all atmospheric agents, as well as with chemical factors, and consequently, is of perpetual duration, and join to these advantages the smallness of the price of acquisition. This material is now as cheap as iron of the same weight, and as a large sale is counted on, it will not be long until the

reduction of price will be below the cost of wood. No doubt many industries will profit from this new progress in the fabrication of glass, and it will be greatly appreciated in the household. One will see the time when the metals and wood will be replaced by glass, in a great number of implements, utensils, and objects of diverse nature, such as stop-cocks, gutter spouts, buckets, and even barrels.—*L' Technologiste.* J. F.

AGUE A POISON.

T. L. LEWIS, BOLIVAR, MO.

A French chemist, M. P. Bolestra, in a communication to the French Acadmy, some time ago, offered the following theory in regard to ague. In water undergoing putrefaction he found a granular microphyte, resembling the *Cactus Peruvianus*. It grows on the surface of the water, and in its young state looks like oil, and is ornamented with rainbow tints. In water of low temperature, or that containing but little vegetable matter, it grows but slowly, but under the the direct solar rays, mixed with decomposing vegetation, it develops rapidly and continually disengages small gas bubbles. It is always accompanied with great numbers of small spores, $\frac{1}{100}$ of a millimetre in diameter, and sporangia or vesicles containing spores from $\frac{2}{100}$ to $\frac{3}{100}$ of a millimetre in diameter, and of a very peculiar form. These spores are of a greenish yellow, quite transparent, and are often detected in marshy atmosphere. He claims to have contracted ague three times from these spores, which he claims to constitute *ague poison.* He says that "a few drops of arsenious acid, sulphate of soda, or, still better, neutral sulphate of quinine, stops its vegetation at the surface of the water, the spores become thin and transparent, and the sporangia alter so that they would not be recognized. These changes may be seen under the microscope."

HYGIENE.

WHAT TO DO IN EMERGENCIES.

From two of the valuable papers on "Domestic Nursing," by Miss E. R. Scovil, of the Massachusetts General Hospital in this city, we cull and condense the following extracts for the benefit of our non-professional readers:—

In very severe cases of burns or scalds the nervous system is so prostrated by the shock that there is often less suffering felt than when the injury is slighter. The pulse will be small and quick, and a stimulant should be administered without waiting for the doctor. A teaspoonful of raw brandy, or a tablespoonful in an equal quantity of water, may be given.

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The whole theory of dressing is to exclude the air. The more effectually this is done the greater will be the relief afforded. When only a small surface is injured, an artificial skin may by formed with flexible collodion; or if that is not at hand common mucilage or gum arabic dissolved in warm water will answer. As one layer dries another should be painted over it.

An excellent remedy for burns and scalds is a mixture of lime-water and sweet or linseed oil in equal parts. Another excellent one is bicarbonate of soda. The common kind used for cooking purposes may be employed. A thick layer should be spread over the part and cover with a light wet bandage, keeping it moist and renewing it when necessary.

When the clothing takes fire it is well if the victim have presence of mind to stand perfectly still. Motion fans the flames and causes it to burn more quickly. He may throw himself on the floor and roll over and over, but never move from place to place seeking help. A woolen shawl, piece of carpet, or rug may be wrapped tightly around the person, not covering the face, and if there is time to wet it so much the better, but there is not an instant to lose, particularly if the clothes is of cotton. The great object is to prevent the flames from getting down the throat and the chest from being burned.

In a severe cut on the finger, when the flow of blood renders dressing it a matter of difficulty, it may be checked by tying a string tightly around the base of the finger. It must then be washed in cold water, and the cut can be dressed at leisure with diachylon or court plaster, and the string removed.

Bleeding from the nose may be stopped by lying flat on the back, with the head raised and the hands held above it. The nose must be covered with a cloth filled with pounded ice, or wrung out of ice water. The head should never be held over a basin, as the position encourages bleeding. The blood may be received in a wet sponge.

When any one coughs or spits up blood the first thought is that it must be from the lungs. A slight knowledge of the characteristics of the bood from different parts that may come through the mouth will sometimes save much needless anxiety. Blood from the lungs is always brighter red in color, because it has just been purified by contact with the air. It is frothy, mixed with mucus, in small quantity, and is usually coughed up. Blood from the stomach is dark red, almost black, it is mixed with particles of food, comes in large quantities, and is vomited. Blood from the mouth and gums is of a red color, and usually mixed with saliva. Unless it has first been swallowed, it is not vomited or coughed up

In hæmorrhage from the lungs the head and shoulders must be raised. Some physicians recommend a tablespoonful of table salt to be given in a tumbler of water. It is always safe to give cracked ice. Bleeding from the stomach may be checked by the application of a mustard plaster over the stomach. Cracked ice should be given and the doctor sent for.

In bleeding from wounds or recent amputation there are three things that may be done:—

First, press the finger or hand over the bleeding point:

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Second, press on the main artery supplying the wound; or, if this cannot be found, apply a bandage as tightly as possible above the wound. An excellent tourinquet may be improvised by knotting a handkerchief closely around the limb, thrusting a short stick through it, and twisting it tight. The blood from an artery is bright red and comes in spurts with each beat of the heart, while that from the veins is a dark purplish color and flows in a steady stream. When the bleeding is from an artery the pressure should be applied between the wound and the heart, when from a vein the limb must be compressed beyond the wound.

Third, raise the part above the rest of the body, that the blood may drain out of it, and support it on pillows. It should be bathed in ice water and have ice wrapped in cotton cloths laid on it. If faintness ensues the sufferer should not be immediately roused, as this is nature's remedy and acts by lessening the force and activity of the circulation. A physician should be called in as soon as possible.

When poison has been swallowed the first thing to be done is to get it out of the stomach as soon as possible, before it has been absorbed into the system. As a stomach-pump does not form part of the furniture of an ordinary house, this must be effected by means of an emetic. Should none other be accessible, stir a tablespoonful of mustard into a tumbler of warm water, and give one-fourth of it at a time, following each dose with a cup of warm water; table salt will do as well, using as much as the water will dissolve. When vomiting is over, the whites of two eggs stirred in a tumbler of water may be given, and as much warm milk as can be taken.—*Boston Journal of Chemistry.*

NECROLOGY.

GENERAL ALBERT J. MYER, U. S. A.

General Albert J. Myer, Chief Signal Officer U. S. A., died of heart disease at Buffalo, N. Y., on the 24th ult. leaving a wife and six children.

He was best known as a meterologist and the organizer of the United States and International Storm Signal Service; but this was by no means his only public work. He entered the army as an assistant surgeon, September 18, 1854, having but three years before gratuated in medicine, at the University of Buffalo, N. Y. From 1858 to 1860 he was on special duty in the signal service. Under the act of Congress passed March 3d, 1863, he was made Colonel and Chief Signal Officer, after having served with distinction under Generals McClellan, Butler and others, and was subsequently brevetted as Brigadier General for "distinguished services in organizing, instructing and commanding the signal corps of the army, and for its especial service October 5th, 1864." In 1864 the signal corps of the army comprised over 1,500 officers and men, under his command, which force, at the close of the war, was reduced to about 150 members.

XUM

Early in 1870 Hon. H. E. Paine, of Wisconsin, introduced a bill in Congress providing for the establishment of a system of storm signals, based upon meteorological observations by the signal corps and officers of the army, and General Myer was placed in charge of the work. To this genial task he devoted himself with great ardor and success, establishing for the first time in meteorology a broad system of simultaneous reports of the weather, founded upon simultaneous observations taken all over the country at the same moment of actual (not local) time, and embodied upon weather maps issued thrice daily from the Signal office at Washington, as well as telegraphed to all prominent points for the information and warning of navigators, farmers and others.

The importance of this service was recognized by his being assigned to duty according to his commission as Brevet Brigadier-General in June, 1871. In March, 1873, Congress made it the further duty of the signal corps to establish signal sections at light-houses, life-saving stations, etc., and to connect them by telegraph with such points as were necessary to accomplish the objects in view, thus enabling General Myer still further to extend his system of simultaneous observations of the weather. The last Congress made him a full Brigadier General

In September, 1873, at the International Meteorological Congress, at Vienna, he was the representative of the United States and there proposed a system of uniform observations, with a view to their daily exchange, to be taken and recorded simultaneously at as many stations as practicable all over the world. This proposition was adopted and the observations were commenced at once with semi-monthly exchanges. In 1875 the publication of a daily International Bulletin was commenced, and in 1878 that of a daily International Weather Map, with the most valuable results. The gradual extension of this system of International observations to every portion of the globe, so as to permit the announcement of approaching storms and changes for periods longer in advance than have been heretofore practicable, was the cherished desire of General Myer's heart; but it was not to be so. He died at the early age of fifty-two years; fortunately leaving his work in the hands of experienced and zealous followers, who will undoubtedly carry out in full his intentions and aims.

CARL PETERSON.

The death, at the age of sixty-seven years, of the Danish explorer, Carl Peterson who had made so many voyages to the North Pole, has been announced at Copenhagen. From 1850 to 1851 he took part in the English expedition of Capt. Parry, in seach of the survivors of the Franklin Expedition. From 1853 to 1855 he accompanied Dr. Kane's Expedition, of which, he was one of the few survivors. From 1857 to 1859 he was with Sir Leopold McClintock, whose expedition brought back many relics of the Franklin Expedition. Finally, he took part in the voyage of Spitzberg on the *Irnite*, during which, he was accompanied by Dr. Nordenskjold.

XUM

EDITORIAL NOTES.

THE first meeting of the fall and winter session of the Kansas City Academy of Science, will be held at its rooms on Tuesday evening, September 28th, and on the last Tuesday of each month thereafter, until the next summer vacation.

THE rainstorm of Sunday, Aug. 15, would have passed for a very respectable "cloud-burst" or "water-spout" if it had occurred in the Rocky Mountains. Between 3:15 and 4:50 p. m. two inches of water fell, as observed by Mr. Kenmuir; which, if it had fallen upon precipitous mountain sides, would have filled any ordinary valley or cañon in a brief space of time, and to a depth that would have done a great deal of damage.

THERE was frost in the interior river counties of New York on Aug. 15th. At Stamford, Delaware county, ice formed. The temperature there at 6 a. m. was thirty-two degrees. A dispatch from Rondout says tender vegetation was killed by the frost on that night. The growing crops of corn and buckwheat are somewhat injured. A stage driver reported light snow in Stony Cleave, Ulster county. At the same time the mercury here and in this vicinity stood at 80° at 7 a. m., 93° at 2 p. m. and 75° at 10 p. m.

A SOCIETY has been formed in England with the object of making systematic excavations in ancient Egypt. Many learned Egyptologists have promised it their support. Miss Edwards proposes to deliver a series of lectures, in this country, for the purpose of procuring funds for the enterprise.

PROFESSOR Von Geert, already distinguished for his scientific explorations in Peru and other countries of South America, left Panama June 10th, for Guatemala, where he proposes to study the botany of that country, and to make collections of new specimens, which he hopes to find in the northeast part of that Republic, which is, as yet, scarcely known from a practical standpoint.

ON the evening of August 12th at about 9 o'clock we witnessed a very fine auroral display, which was also observed throughout the northern and eastern States.

WE are indebted to Dr. John Rae, of London, England, for a copy of his sketch of the life and labors of the great Arctic navigator, Nordenskjold. We have read nothing so interesting and complete, and hope to give it to our readers at an early date.

THE number of meteors observed here in the nights of August 10th and 11th, was quite as large as usual, in some parts of the heavens numbering five or six to the minute for several hours on both nights.

ITEMS FROM THE PERIODICALS.

PROMINENT among the articles in the London *Monthly Journal of Science*, is a series of letters by Dr. C. K. Akin, pointing out the proper course for the Royal Society and other scientific associations to pursue, to render their work more effective and valuable; on the changes needed in the system of teaching at the British Universities to cause them to become more successful in fostering and advancing the growth of science in England; and on the kind of scientific literature, periodic and nonperiodic, that is required to place before the students of science the results of experiments by their leaders and teachers. It also contains an article on The Constitution of the Earth, by Robert Ward, a Defense of Vivisection and a continuation of Prof. Tyndall's Lecture on Water and Air, etc.

XUM

THE *Mining Record* gives an interesting statement of an excursion made to Santa Fe by Mr. Vandermeer. In the course of his trip, he visited the Indian village of Tosoque, the inhabitants of which claim to have descended directly from the Aztecs. They are more industrious and intelligent than the Red Skins. They inhabit houses of two stories, and have no communication with the ground floor except by ladders. In case of alarm or surprise the ladder is drawn up into the second story, and the house thereby converted into a fortress. Each house has three or four rooms, and the village has altogether about 200 inhabitants.

THE *Columbia Sentinel* reports that Mr. R. B. Gans, a farmer of Boone county, has constructed several small telescopes, which are excellent instruments, and that he is now working upon one of seven inches aperture. He has also invented and constructed a machine for grinding the glasses which is superior to any now in use. One of his telescopes is now on exhibition at the Missouri University, and is pronounced by Prof. Ficklin and others to be a perfect instrument. His next effort will be upon one of 16½ inches diameter and 20 feet focal length. The wonder in this case is that Mr. Gans has never had any training whatever in this direction, but is an amateur in the strictest sense.

BOSTON has at least two good periodicals in their respective departments, the *Journal of Commerce* and the *Journal of Chemistry*. Both are ably edited, widely read and perfectly reliable. We frequently take occasion to borrow articles from them and always feel when we do so that we are giving our readers valuable and readable matter.

JUDGING from accounts in the *Engineering and Mining Journal*, the absence of all of the precious metals in any one of the States or Territories would seem to be the exception to a general rule. Gold mines in New England, New York and New Jersey, Virginia and North Carolina are announced, (also in Nova Scotia,) while silver mines are spoken of in Missouri and Arkansas, as well as both kinds all through the western mountains, California and Arizona. Truly, the outlook for the prosperity of the United States never was so promising.

THE *Journal of the Franklin Institute* has its usual quota of interesting scientific articles. Among others we note one on the Limitations of the Steam Engine, by Prof. Wm. Dennis Marks, of the University of Pennsylvania, in which the author remarks that so far as evaporation is concerned the perfect boiler has probably been attained, and that the utilization of the steam after it reaches the engine is the principal point to be looked after. Next come concentration of power in a small space and economy of steam. Then the prevention of condensation by cooling, which he proposes to accomplish by diminishing the condensation surface and increasing the number of the strokes of the piston; also the reduction of the diameters of the frictional bearings to their lowest practical size and the attainment of high and regular speed. The article is an interesting one but it cannot be condensed and we only give the above points, to stimulate the reader of mechanical turn to procure and read it in full.

THE *Phrenological Journal*, for September, contains analytical articles upon Hancock and English; Studies in Comparative Phrenology; Notes on the Psychology and Patholo of the brain; Relation of food to morals; Notes on science, agriculture, Editorial items, etc.

THE essay upon the History of the word Chemistry, by Dr. R. Augus Smith, F. R. S., before the Manchester Literary and Philosophical Society, March 23d, an abstract of which is given in the *Chemical News*, contains a good deal of new matter, showing a vast deal of research and study into the history of the Hebrews, Assyrians, Egyptians and Greeks, and furnishing results interesting not only to the chemist but also to the student of ancient languages.

XUM

IN the September *Atlantic* we find the concluding chapters of "The Stillwater Tragedy," one of the most vigorous, ingenious and delightful novels Mr. Aldrich has yet written. Richard Grant White describes a visit to Oxford and Cambridge, which will have great interest for many readers. The Washington Reminiscences this time relate to the short-lived Harrison Administration. There are two good political articles—one on the "Progress of the Presidential Canvass," the other on the important subject of the "Political Responsibility of the Individual," by R. R. Bowker. Mark Twain contributes a characteristic story of "Mrs. McWilliams and the Lightning" T. S. Perry writes instructively of Sir Walter Scott. Mrs Kate Gannett Wells discusses "Women in Organizations." Other stories, poems, essays, criticisms of new books, and a bright "Contributors' Club" complete a thoroughly enjoyable number of this magazine.

WE have made arrangements with J. Fitzgerald & Co., of New York to furnish the *Humboldt Library* in connection with the REVIEW, or to old subscribers of the REVIEW, at a discount of 20 per cent. For particulars regarding the *Humboldt Library* see Book Notices on page 307 in this issue of the REVIEW.

Harper's Magazine for September is a bright, strong number, rich in illustration, and piquant with several novel features. Especially novel in magazine literature is such an article as that by K. M Rowland, on the Family of George III., illustrated with twenty-one portraits. A briefer article, entitled "The American Graces," is a biographical sketch, with beautiful portraits of the three Misses Caton, of Baltimore, who were respectively, Lady Stafford, Marchioness of Wellesley, and Duchess of Leeds. Mr. Conway contributes "The Seven Sleepers' Paradise beside the Loire." Mrs. Rebecca Harding Davis concludes her "By-paths in the Mountains" with a description of the North Carolina Mountains. Mr. Bishop also concludes his "Fish and Men in the Maine Islands," full of entertaining marine studies, effectively illustrated by Mr. Burn's sketches. Contrasting with all this beauty, but eminently picturesque in manner and illustration, is Mr. Rideing's article, "Squatter-life in New York." Miss Anna C. Brackett contributes a suggestive article, entitled "Indian and Negro," apropos of a recent visit to the Hampton school. In fiction the Number is very strong. The "Editor's Easy Chair" gossips in its best vein concerning old Newport, and the women of England and America, and gives some interesting reminiscences of the late George Ripley.

THE September *Popular Science Monthly* well sustains its character as a magazine of valuable reading. It is the only periodical we have which reports progress in the higher and broader applications of science that concern everybody. Its contents for September are as follows: The Science of Comparative Jurisprudence, by William M. Ivins; State Educations: A Help or Hindrance? by the Hon. Auberon Herbert; How Animals Digest, by Herman L. Fairchild, (illustrated); The Solar System and its Neighbors, by C. B. Warring, Ph. D.; Legal Prosecutions of Animals, by William Jones, F. S. A.; Psychogenesis in the Human Infant, by Prof. W. Preyer; Climbing plants, by Francis Darwin, F. L. S., (illustrated); Æsthetic Feeling in Birds, by Prof. Grant Allen; Electricity and Agriculture, by Dr. Paget Higgs; Zoölogical Education, by Prof. W. S. Barnard; The English Precursors of Newton; Night-Schools in New York and Paris. by Alice H. Rhine; Sketch of Joseph Leidy, M. D., (with portrait); Correspondence; Editor's Table; Literary Notices; Popular Miscellany, and Notes.

WE observe that Captain H. W. Howgate is very favorably spoken of as the successor of General Myer, late chief Signal Officer of the Army. His long experience (since 1863), and his devotion to meteorological studies render him peculiarly fitted for the place, but it is hardly to be hoped that the claims of other and ranking officers will be overlooked. Should the Signal Service proper and the Meteorological Service be dissociated, no one could fill the latter named place better.

XUM

L' Exploration. This valuable weekly continues to reach our sanctum regularly. Each number has inclosed a valuable map, which, in the copy before us, is a delineation of the new frontiers of Greece. The two former gave sections of Africa and are to be followed by additional sections, until a map of the whole of Africa, comprising the latest explorations, shall have been furnished. We translate the summary of contents as follows: The New Frontiers of Greece—Col. Prjévalski's Expedition to Thibet—Learned Societies—The Commercial Geographical Society of Bordeaux—The Normand Geographical Society—News from all Parts of the Globe—Europe—The Archæological Exploration in Ancient Lydia—Mourmain Exploration—Petroleum in Russia—Explorations in Siberia—Lake Onéga—The Caucasus—The Discovery of a Necropolis—Asia—The Kingdom of Israel—Fucus gummiflua—Explorations in Indo-China—Mineral Riches of Japan—Africa— Oriental Africa—New Belgian Expedition to Africa—The Eastern Cape—France and Western Africa—America Arctic Expeditions—Hudson River Tunnel—Niagara—Mouths of the Mississippi—Wild Lands of the United States—Oceanic—The Port-Breton Colony—Earthquake in the Phillipine Islands, et. J. F.

THE September Number of the *North American Review* contains the initial paper by M. D. Charnay on "The Ruins of Central America." This article is illustrated by photographs, which aid materially in the study of the text. An expedition under the auspices of the American and French governments, of which M. Charnay is in charge, is now operating in Central America, and the explorations are likely to create an interest more profound, and to be attended with more valuable archeological results, even than came from the researches of Champollion in Egypt. They promise a new chapter in American history that shall establish the origin of the remarkable race of which nothing but splendid ruins were left when Columbus discovered the new world. Following this article is one on "The Perpetuity of Chinese Institutions," from the pen of S. Wells Williams. Gen. John W. Clampitt, the surviving member of Mrs. Surratt's counsel, writes upon "The Trial of Mrs. Surratt." "The Personality of God" is discussed by W. T. Harris, LL. D R. B. Forbes gives some valuable suggestions in reference to "Steamboat Disasters." The Rev. Edward Everett Hale follows with a paper upon "Insincerity in the Pulpit." The number closes with a review of several recent works on the Brain and Nerves, by Dr. George M. Beard.

THE *American Naturalist* for September presents the following named original articles: The Syphonophores, by J. Walter Fewkes; Destruction of Obnoxious Insects by means of Fungoid Growths, by A. N. Prentiss; List of Birds of the Willamette Valley, Oregon, by O. B. Johnson, and Do Flying-Fish Fly? by C. O. Whitman. The Editor's Table is devoted to reasons why the Government should foster scientific research, and these reasons are set forth both forcibly and unanswerably. The General Notes, as usual, comprise a brief abstract of progress in Botany, Zoölogy, Anthropology, Geology, Paleontology, Geography and Microscopy. These abstracts are furnished by such scientists as Dr. Coues, Prof. O. T. Mason, Prof. Yarnall and Dr. R. H. Ward. The Book Reviews are written in a vigorous and comprehensive style, yet with fairness and liberality, and constitute a valuable feature of the magazine.